

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **INTRODUCTION TO AGRICULTURAL MECHANIZATION**  
**MODULE CODE** : **CAAM 101**  
**LEVEL** : **1**  
**SEMESTER** : **1**  
**CREDIT UNIT** : 2.0  
**CONTACT HOUR** : 1 hr/week (T) 2 hr/week (P)  
2 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Carry out engine schedule maintenance
- Carry out transmission system schedule maintenance
- Carry out steering system schedule maintenance
- Carry out brake system schedule maintenance
- Carry out hydraulic system schedule maintenance
- Carry out undercarriage schedule maintenance
- Carry out final drive schedule maintenance

## MODULE DESCRIPTION

This unit identifies the competence required to carry out engine schedule maintenance using hand tools set, lubrication oil, oil filter, filter wrench, air compressor, coolant, engine schedule maintenance manual, new fan belt, oil dispenser and check list so that engine schedule maintenance manual obtained, engine condition checked, engine servicing executed and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to carry out transmission system scheduled maintenance using hand tool set, tray, transmission oil, oil dispenser, rags, transmission schedule maintenance manual and service checklist so that transmission schedule maintenance manual identified, transmission servicing works checked, transmission servicing works executed and service checklist recorded in accordance with manufacturer's specification.

This unit identifies the competence required to carry out steering system schedule maintenance using hand tools set, steering oil, grease, rags, steering system schedule maintenance manual and service checklist so that steering system schedule maintenance manual obtained, steering system servicing works checked, steering system servicing works executed and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to carry out brake system scheduled maintenance using hand tools set, brake system schedule maintenance manual, brake oil and service checklist so that brake system schedule maintenance manual obtained, brake system servicing

works checked, brake system servicing works executed and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to carry out hydraulic system schedule maintenance using hand tool set, hydraulic oil, special tools, container, hydraulic system schedule maintenance manual and service checklist so that hydraulic system schedule maintenance manual obtained, hydraulic system servicing works checked, hydraulic system servicing works executed and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to Carry out undercarriage schedule maintenance using hand tools set, undercarriage schedule maintenance manual, grease, grease gun, final drive oil and service checklist so that undercarriage schedule maintenance manual obtained, undercarriage servicing works checked, undercarriage servicing works execute and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to Carry out final drive schedule maintenance using hand tool set, tray, final drive oil, final drive schedule maintenance manual, oil dispenser, rag, breather and final drive service checklist so that final drive schedule maintenance manual obtained, final drive servicing works checked, final drive servicing works executed and service checklist compiled in accordance with manufacturer's specification.

This unit identifies the competence required to verify scheduled maintenance works using verification checklist, maintenance log book and maintenance report so that scheduled maintenance service checklist obtained, scheduled maintenance data findings checked, confirmed and scheduled maintenance record updated in accordance with standard operating procedure.

## CONTENT AND LEARNING STANDARD

**Programme : AGRICULTURAL MECHANIZATION**

**Module 1: INTRODUCTION TO AGRICULTURAL MECHANIZATION**

**COMPETENCY : 1** Carry out engine schedule maintenance

| CONTENT<br>STANDARD<br>performance       | Hrs | LEARNING STANDARD<br>performance , condition  | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|---|---|
| 1. Carry out engine schedule maintenance |     | 1.1 Obtain engine schedule maintenance manual | 1.1.1 Explain Sources of engine schedule maintenance manual<br>1.1.2 Explain procedures of obtaining engine schedule maintenance manual<br>1.1.3 Identify types of engine schedule maintenance manual<br>1.1.4 Determine source of engine schedule maintenance manual<br>1.1.5 Follow procedure of obtaining engine schedule maintenance Manual<br>1.1.6 Interpret engine schedule maintenance manual<br>1.1.7 Read and observe precaution warnings given by manual |

**COMPETENCY 2 : Carry out transmission system schedule maintenance**

| <b>CONTENT<br/>STANDARD<br/>performance</b>           | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 2. Carry out transmission system schedule maintenance |            | 2.1 Obtain transmission schedule maintenance manual  | 2.1.1 Sources of transmission schedule maintenance manual<br>2.1.2 Procedures of obtaining transmission schedule maintenance manual<br>2.1.3 Types of transmission schedule maintenance manual<br>2.1.4 Determine source of transmission schedule maintenance manual<br>2.1.5 Acquire transmission schedule maintenance manual<br>2.1.6 Interpret transmission schedule maintenance manual<br>2.1.7 Read and observe precaution warnings given by manual |
|   |            | 2.2 Check transmission servicing works               | 2.2.1 Identify Types of transmission servicing works<br>2.2.2 Explain Methods of handling inspection tools<br>2.2.3 Explain Procedures of inspecting engine condition<br>2.2.4 Determine transmission schedule maintenance<br>2.2.5 Apply method of handling inspection tools<br>2.2.6 Follow procedure of inspecting engine condition<br>2.2.7 Meticulous in inspecting engine<br>2.2.8 Proper usage of service manual                                  |

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|--|--|--|---|
|  |  | 2.3 Execute transmission servicing works | <p>2.3.1 Identify Types of transmission schedule maintenance</p> <p>2.3.2 Identify Types of transmission oil</p> <p>2.3.3 Identify Types of grease</p> <p>2.3.4 Identify Types of magnetic strainer</p> <p>2.3.5 Describe Procedures of changing lubrication oil and oil filter</p> <p>2.3.6 Explain Methods of changing fan belt</p> <p>2.3.7 Identify Types of engine servicing works defects</p> <p>2.3.8 Describe Procedures of inspecting transmission servicing works</p> <p>2.3.9 Interpret transmission schedule maintenance</p> <p>2.3.10 Change transmission oil</p> <p>2.3.11 Grease transmission parts such as propeller shaft</p> <p>2.3.12 Wash magnetic strainer</p> <p>2.3.13 Follow procedure of changing lubrication oil and oil filter</p> <p>2.3.14 Apply method of changing fan belt</p> <p>2.3.15 Determine types of transmission servicing works defects</p> <p>2.3.16 Follow procedure of inspecting transmission servicing works</p> <p>2.3.17 Careful when lubricants and greases, its may splitting to the eyes</p> <p>2.3.18 Tidy up working area</p> |
|  |  | 2.4 Compile service checklist            | <p>2.4.1 Types of service checklist</p> <p>2.4.2 Technique of fill in service checklist</p> <p>2.4.3 List Methods of fill in service checklist</p> <p>2.4.4 Recording of service checklist</p> <p>2.4.5 Filing of service checklist</p> <p>2.4.6 Determine types of service checklist</p> <p>2.4.7 Fill in service checklist</p> <p>2.4.8 Apply technique of filling in service checklist</p> <p>2.4.9 Record service checklist</p> <p>2.4.10 File service checklist</p> <p>2.4.11 Meticulous in filling service checklist form</p> <p>2.4.12 Meticulous in filing information</p>  |

**COMPETENCY : 3** Carry out final drive schedule maintenance

| <b>CONTENT<br/>STANDARD<br/>performance</b>   | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 3. Carry out final drive schedule maintenance |            | 3.1 Obtain final drive schedule maintenance manual   | 3.1.1 Sources of final drive schedule maintenance manual<br>3.1.2 Procedures of acquiring final drive schedule maintenance manual<br>3.1.3 Final drive schedule maintenance manual<br>3.1.4 Determine source of final drive schedule maintenance manual<br>3.1.5 Acquire final drive schedule maintenance manual<br>3.1.6 Interpret final drive schedule maintenance manual<br>3.1.7 Carefully read and observe precaution warnings given by manual |
|   |            | 3.2 Check final drive servicing works                | 3.2.1 Types of final drive system<br>3.2.2 Methods of handling inspection tools<br>3.2.3 Procedures of checking final drive system condition<br>3.2.4 Determine final drive system condition<br>3.2.5 Apply method of handling inspection tools<br>3.2.6 Follow procedure of checking final drive system condition<br>3.2.7 Meticulous in checking final drive system condition<br>3.2.8 Proper usage of service manual                             |
|   |            | 3.3 Execute final drive servicing works              | 3.3.1 Final drive schedule maintenance<br>3.3.2 Types of final drive oil<br>3.3.3 Types of breather<br>3.3.4 Interpret final drive schedule maintenance<br>3.3.5 Inspect final drive oil level<br>3.3.6 Change final drive oil<br>3.3.7 Change breather unit<br>3.3.8 Avoid splash final drive oil to skin, floor and eyes  |

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|  |  | 3.4 Compile service checklist | <p>3.4.1 Types of service checklist</p> <p>3.4.2 Technique of fill in service checklist</p> <p>3.4.3 Methods of fill in service checklist</p> <p>3.4.4 Recording of service checklist</p> <p>3.4.5 Filing of service checklist</p> <p>3.4.6 Determine types of service checklist</p> <p>3.4.7 Fill in service checklist</p> <p>3.4.8 Apply technique of filling in service checklist</p> <p>3.4.9 Record service checklist</p> <p>3.4.10 File service checklist</p> <p>3.4.11 Meticulous in filling service checklist form</p> <p>3.4.12 Meticulous in filing information</p> <p>3.4.13 Meticulous when recording scheduled maintenance book</p> |
|--|--|-------------------------------|--|



**COMPETENCY : 4** Carry out steering system schedule maintenance

| <b>CONTENT<br/>STANDARD<br/>performance</b>       | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>   | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 4. Carry out steering system schedule maintenance |            | 4.1 Obtain Steering System Schedule Maintenance Manual | 4.1.1 Sourcing of steering system schedule maintenance manual<br>4.1.2 Describe Procedures of acquiring steering system schedule maintenance manual<br>4.1.3 Identify Types of steering system schedule maintenance manual<br>4.1.4 Source of steering system schedule maintenance manual<br>4.1.5 Follow procedure of acquiring steering system schedule maintenance manual<br>4.1.6 Interpret steering system schedule maintenance manual<br>4.1.7 Read and observe precaution warnings given by manual |
|   |            | 4.2 Check Steering System Servicing Works              | 4.2.1 Describe Types of steering system condition<br>4.2.2 Explain Methods of handling inspection tools<br>4.2.3 Describe Procedures of inspecting Steering System condition<br>4.2.4 Determine steering system condition<br>4.2.5 Apply method of handling inspection tools<br>4.2.6 Follow procedure of inspecting Steering System condition<br>4.2.7 Meticulous in inspecting engine<br>4.2.8 Proper usage of service manual   |

|  |  |                                   |   |
|--|--|-----------------------------------|---|
|  |  | 4.3 Execute Steering System Works | <p>4.3.1 Explain Steering system schedule maintenance</p> <p>4.3.2 Identify Types of steering oil</p> <p>4.3.3 Identify Types of grease</p> <p>4.3.4 Identify Types of steering system servicing works defects</p> <p>4.3.5 Explain Procedures of inspecting system servicing works</p> <p>4.3.6 Interpret steering system schedule maintenance</p> <p>4.3.7 Inspect steering oil level</p> <p>4.3.8 Grease steering linkage and bushing</p> <p>4.3.9 Determine type of steering system servicing works defects</p> <p>4.3.10 Follow procedure of inspecting system servicing works</p> <p>4.3.11 Careful when lubricants and greases, its may splitting to the eyes</p> <p>4.3.12 Tidy up working area</p> |
|  |  | 4.4 Compile Service checklist     | <p>4.4.1 Identify Types of service checklist</p> <p>4.4.2 Technique of fill in service checklist</p> <p>4.4.3 Methods of fill in service checklist</p> <p>4.4.4 Recording of service checklist</p> <p>4.4.5 Filing of service checklist</p> <p>4.4.6 Determine types of service checklist</p> <p>4.4.7 Fill in service checklist</p> <p>4.4.8 Apply technique of filling in service checklist</p> <p>4.4.9 Record service checklist</p> <p>4.4.10 File service checklist</p> <p>4.4.11 Meticulous in filling service checklist form</p> <p>4.4.12 Meticulous in filing information</p>  |

**COMPETENCY : 5** Carry out brake system schedule maintenance

| <b>CONTENT<br/>STANDARD<br/>performance</b>    | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|--|------------|--|---|
| 5. Carry out brake system schedule maintenance |            | 5.1 Obtain brake system schedule maintenance manual  | 5.1.1 Sources of brake system schedule maintenance manual<br>5.1.2 Procedures of acquiring brake system schedule maintenance manual<br>5.1.3 Brake system schedule maintenance manual<br>5.1.4 Determine source of brake system schedule maintenance manual<br>5.1.5 Acquire brake system schedule maintenance manual<br>5.1.6 Interpret brake system schedule maintenance manual<br>5.1.7 Carefully read and observe precaution warnings given by manual |
|  |            | 5.2 Check brake system servicing works               | 5.2.1 List Types of Brake System condition<br>5.2.2 Describe Methods of handling inspection tools<br>5.2.3 Explain Procedures of inspecting brake system condition<br>5.2.4 Determine brake system condition<br>5.2.5 Apply method of handling inspection tools<br>5.2.6 Follow procedure of inspecting brake system condition<br>5.2.7 Meticulous in inspecting brake system condition<br>5.2.8 Proper usage of service manual                           |

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|  |  | 5.3 Execute brake system servicing works | 5.3.1 Define Brake system schedule maintenance<br>5.3.2 Identify types of brake oil<br>5.3.3 Describe Functions of brake oil<br>5.3.4 Bleeding brake system method<br>5.3.5 Interpret brake system schedule maintenance<br>5.3.6 Inspect brake oil level<br>5.3.7 Top up/change brake oil (if necessary)<br>5.3.8 Apply bleeding brake system method<br>5.3.9 Avoid splash brake fluid to skin and eyes<br>5.3.10 Tidy up working area  |
|  |  | 5.4 Compile service checklist            | 5.4.1 State Types of service checklist<br>5.4.2 Explain Technique of fill in service checklist<br>5.4.3 Identify Methods of fill in service checklist<br>5.4.4 Recording of service checklist<br>5.4.5 Filing of service checklist<br>5.4.6 Determine types of service checklist<br>5.4.7 Fill in service checklist<br>5.4.8 Apply technique of filling in service checklist<br>5.4.9 Record service checklist<br>5.4.10 File service checklist<br>5.4.11 Meticulous in filling service checklist form<br>5.4.12 Meticulous in filing information |

**COMPETENCY : 6** Carry out hydraulic system schedule maintenance

| <b>CONTENT STANDARD<br/>performance</b>            | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>    | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|--|------------|---|---|
| 6. Carry out hydraulic system schedule maintenance |            | 6.1 Obtain hydraulic system schedule maintenance manual | 6.1.1 Explain Sources of hydraulic system schedule maintenance manual<br>6.1.2 List Procedure of acquiring hydraulic system schedule maintenance manual<br>6.1.3 Identify types of hydraulic system schedule maintenance manual<br>6.1.4 Determine source of hydraulic system schedule maintenance manual<br>6.1.5 Acquire hydraulic system schedule maintenance manual<br>6.1.6 Interpret hydraulic system schedule maintenance manual<br>6.1.7 Read and observe precaution warnings given by manual   |
|  |            | 6.2 Check hydraulic system servicing works              | 6.2.1 List Types of hydraulic system<br>6.2.2 Describe Methods of handling inspection tools<br>6.2.3 State Procedures of inspecting hydraulic system condition<br>6.2.4 Meticulous in checking hydraulic system condition<br>6.2.5 Explain Hydraulic system schedule maintenance<br>6.2.6 List Types of hydraulic oil<br>6.2.7 Identify Grade of hydraulic oil<br>6.2.8 Determine hydraulic system condition<br>6.2.9 Apply method of handling inspection tools<br>6.2.10 Follow procedure of inspecting hydraulic system condition<br>6.2.11 Avoid splash hydraulic oil to skin, floor and eyes<br>6.2.12 Tidy up working area |
|  |            | 6.3 Execute hydraulic System servicing works            | 6.3.1 Interpret hydraulic system schedule maintenance<br>6.3.2 Inspect hydraulic oil level<br>6.3.3 Change hydraulic oil  |

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|--|--|-------------------------------|---|
|  |  | 6.4 Compile service checklist | <p>6.4.1 Identify Types of service checklist</p> <p>6.4.2 State Technique of fill in service checklist</p> <p>6.4.3 Describe Methods of fill in service checklist</p> <p>6.4.4 Recording of service checklist</p> <p>6.4.5 Filing of service checklist</p> <p>6.4.6 Determine types of service checklist</p> <p>6.4.7 Fill in service checklist</p> <p>6.4.8 Apply technique of filling in service checklist</p> <p>6.4.9 Record service checklist</p> <p>6.4.10 File service checklist</p> <p>6.4.11 Meticulous in filling service checklist form</p> <p>6.4.12 Meticulous in filing information</p> |
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**COMPETENCY : 7** Carry out undercarriage schedule maintenance

| <b>CONTENT<br/>STANDARD<br/>performance</b>     | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 7. Carry out undercarriage schedule maintenance |            | 7.1 Obtain undercarriage schedule maintenance manual | 7.1.1 Sources of undercarriage schedule maintenance manual<br>7.1.2 Procedures of acquiring undercarriage schedule maintenance manual<br>7.1.3 Undercarriage schedule maintenance manual<br>7.1.4 Determine source of undercarriage schedule maintenance manual<br>7.1.5 Acquire undercarriage schedule maintenance manual<br>7.1.6 Interpret undercarriage schedule maintenance manual<br>7.1.7 Carefully read and observe precaution warnings given by manual |
|   |            | 7.2 Check undercarriage servicing works              | 7.2.1 Types of undercarriage system<br>7.2.2 Methods of handling inspection tools<br>7.2.3 Procedures of checking Undercarriage system condition<br>7.2.4 Determine undercarriage system condition<br>7.2.5 Apply method of handling inspection tools<br>7.2.6 Follow procedure of checking undercarriage system condition<br>7.2.7 Meticulous in checking undercarriage system condition<br>7.2.8 Proper usage of service manual                               |

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|--|--|---|--|
|  |  | 7.3 Execute undercarriage servicing works | <p>7.3.1 Undercarriage schedule maintenance</p> <p>7.3.2 Track tension</p> <p>7.3.3 Types of grease</p> <p>7.3.4 Interpret undercarriage schedule maintenance</p> <p>7.3.5 Inspect track tension</p> <p>7.3.6 Grease track roller outer and inner bearings</p> <p>7.3.7 Measure track tension</p> <p>7.3.8 Careful when lubricants and greases, its may splitting to the eyes</p> <p>7.3.9 Tidy up working area</p>  |
|  |  | 7.4 Compile service checklist             | <p>7.4.1 Types of service checklist</p> <p>7.4.2 Technique of fill in service checklist</p> <p>7.4.3 Methods of fill in service checklist</p> <p>7.4.4 Recording of service checklist</p> <p>7.4.5 Filing of service checklist</p> <p>7.4.6 Determine types of service checklist</p> <p>7.4.7 Fill in service checklist</p> <p>7.4.8 Apply technique of filling in service checklist</p> <p>7.4.9 Record service checklist</p> <p>7.4.10 File service checklist</p> <p>7.4.11 Meticulous in filling service checklist form</p> <p>7.4.12 Meticulous in filing information</p> <p>7.4.13 Meticulous when recording scheduled maintenance book</p> |



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**MODULE INFORMATION**

**Confidential**

**MODULE** : **FUEL AND ELECTRICAL SYSTEM MAINTENANCE**  
**MODULE CODE** : **CAAM 102**  
**LEVEL** : **1**  
**SEMESTER** : **1**  
**CREDIT UNIT** : 4.0  
**CONTACT HOUR** : 1 hr/week (T) 6 hr/week (P)  
7 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Service fuel supply system components
- Service fuel injection pump assembly
- Repair fuel feed pump
- Service carburetor unit
- Carry out removing engine assembly
- Carry out battery maintenance
- Replace electrical instruments and indicator
- Replace horns unit
- Replace viper motor
- Replace capacitor discharge ignition unit (cdi unit)
- Repair lighting system
- Replace exhaust unit
- Replace intake & exhaust manifold

## MODULE DESCRIPTION

This unit identifies the competence required to service fuel supply system components using hand tools set, detergent air compressor, fuel supply service manual and 'O' ring so that fuel supply service manual obtained, fuel supply system components removed, cleaned and installed, and air bleeding works executed (If necessary) in accordance with manufacturer's specification.

This unit identifies the competence required to replace service fuel injection pump assembly using hand tools set, special tool, cotton rags,

*Latest Edited Semester 1, 16 – 19 JULAI 2012*

detergent, tray, brush, and RPM meter so that fuel injection pump service manual obtained, fuel injection pump assembly removed, external body cleaned, fuel injection pump assembly installed and run engine tested in accordance with manufacturer specification.

This unit identifies the competence required to repair fuel feed pump using hand tools set, new parts, solvent, gasket, air compressor, measuring equipment and service manual so that fuel feed pump service manual obtained, fuel feed pump assembly removed, fuel feed pump components dismantled, fuel feed pump components checked and fuel feed pump components assembled, and fuel feed pump assembly installed in accordance with manufacturer's specification.

This unit identifies the competence required to service carburettor unit using hand tools set, new carburettor repair kit, solvent, service manual and air compressor so that carburettor unit service manual obtained, carburettor unit removed, carburettor parts dismantled, cleaned and assembled, carburettor unit installed and engine performance tested in accordance with manufacturer's specification

This unit identifies the competence required to carry out removing engine assembly using hand tools set, hydraulic jack, detergent, engine manual, rags, wheel stopper and lifting equipment so that job order obtained, **agricultural machinery** equipment parked, external attachment and engine assembly removed in accordance with engine's specification.

This unit identifies the competence required to carry out battery maintenance using hand tools set, battery maintenance service manual, hydrometer, voltmeter, distilled water, hot water, battery charger and log book so that battery maintenance service manual obtained, battery maintenance works executed and battery performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to replace electrical instruments and indicator using hand tools set, electrical instruments and indicator service manual, multimeter, log book, new electrical instruments and indicator so that electrical instruments and indicator service manual identified, electrical instrument and indicator display removed, electrical instrument and indicator function ability checked, electrical instrument and indicator display installed, electrical instrument and indicator display operations tested in accordance with manufacturer's specification

This unit identifies the competence required to replace horns unit using hand tools set, horn maintenance service manual, multimeter, test lamp, log book so that horn maintenance service manual obtained, horn unit removed, horn unit installed, horn performance tested in accordance with manufacturer's specification

This unit identifies the competence required to replace wiper motor using hand tools set, wiper motor service manual, multimeter, test lamp, log book so that wiper motor service manual obtained, wiper motor removed, wiper motor installed, wiper motor operations tested in accordance with manufacturer's specification

This unit identifies the competence required to replace capacitor discharge ignition unit (CDI) using hand tools set, capacitor discharge unit service manual, multimeter, capacitor discharge unit, service checklist, log book so that capacitor discharge ignition unit service manual obtained, capacitor discharge ignition unit checked, capacitor discharge ignition unit removed, capacitor discharge ignition unit installed, capacitor discharge ignition unit operations tested in accordance with manufacturer's specification

This unit identifies the competence required to repair lighting system using hand tools set, lighting system service manual, multimeter, test lamp, service checklist, bulbs, fuses, relays, switches, male and female connectors and log book so that lighting system service manual obtained, lighting system components checked, lighting system components replacements works executed, lighting system operations tested in accordance with manufacturer specification

This unit identifies the competence required to replace exhaust unit using hand tools set, anti rush, exhaust gasket, exhaust system service manual and new exhaust unit so that exhaust system service manual obtained, exhaust unit removed, exhaust unit installed and exhaust leakage tested in accordance with manufacturer's specification

This unit identifies the competence required to carry out greasing works using hand tools set, straight edge, filler gauge, inlet & exhaust system service manual, gasket and torque wrench so that inlet & exhaust system manual obtained, external attachment, inlet manifold and exhaust manifold removed, manifold face checked, exhaust manifold and inlet manifold installed, and exhaust system tested in accordance with manufacturer's specifications.

## CONTENT AND LEARNING STANDARD

**Programme : AGRICULTURAL MECHANIZATION**

**Module 2:** FUEL AND ELECTRICAL SYSTEM MAINTENANCE

**COMPETENCY 1:** Service fuel supply system components

| CONTENT<br>STANDARD<br>performance      | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---|-----|--|--|
| 1 Service fuel supply system components |     | 1.1 Obtain Fuel Supply Service Manual        | 1.1.1 Source of fuel supply service manual<br>1.1.2 Procedures of acquiring fuel supply service manual<br>1.1.3 Fuel supply service manual<br>1.1.4 Determine source of fuel supply service manual<br>1.1.5 Acquire fuel supply service manual<br>1.1.6 Interpret fuel supply service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual |

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|--|--|--|--|
|  |  | 1.2 Remove Fuel Supply System Components | <p>1.2.1 Disconnecting battery terminal</p> <p>1.2.2 Types of hand tools</p> <p>1.2.3 Disassemble fuel supply system components</p> <p>1.2.4 Procedures of removing fuel supply system components</p> <p>1.2.5 Disconnect battery terminal</p> <p>1.2.6 Choose type of hand tools</p> <p>1.2.7 Determine disassemble fuel supply system components such as</p> <ul style="list-style-type: none"> <li>• Fuel tank</li> <li>• Pipe lines</li> <li>• Fuel filter</li> </ul> <p>1.2.8 Apply procedure of removing fuel supply system components</p> <p>1.2.9 Disconnect negative battery terminal first</p> |
|  |  | 1.3 Clean Fuel Supply System Components  | <p>1.3.1 Types of solvent / chemical</p> <p>1.3.2 Soaking parts and component procedure</p> <p>1.3.3 Spraying parts and components method</p> <p>1.3.4 Techniques of cleaning fuel supply system component</p> <p>1.3.5 Choose related solvent / chemical</p> <p>1.3.6 Soak parts and component in related solvent / chemical</p> <p>1.3.7 Spray parts and components with pressure air</p> <p>1.3.8 Apply technique of cleaning fuel supply system component</p> <p>1.3.9 Do not use petrol, paraffin or other solvent to remove oil from skin</p>  |

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|--|--|---|--|
|  |  | 1.4 Install Fuel Supply System Components     | 1.4.1 Types of hand tools<br>1.4.2 Procedure of installing fuel supply system components<br>1.4.3 Techniques of reinstalling fuel supply system components<br>1.4.4 Procedures of installing fuel supply system components<br>1.4.5 Choose type of hand tools<br>1.4.6 Change defect parts<br>1.4.7 Follow technique of reinstall fuel supply system components<br>1.4.8 Apply procedure of installing fuel supply system components<br>1.4.9 Meticulous in installing fuel supply system components |
|  |  | 1.5 Execute Air Bleeding Works (If necessary) | 1.5.1 Diesel engine fuel system<br>1.5.2 Location of bleeding point<br>1.5.3 Functions of bleeding work<br>1.5.4 Procedures of air bleeding<br>1.5.5 Connecting battery terminal<br>1.5.6 Loosen bleeding screw at fuel filter<br>1.5.7 Use feed pump to remove air from system<br>1.5.8 Loosen high pressure pipe line flank<br>1.5.9 Apply procedure of air bleeding<br>1.5.10 Connect battery terminal<br>1.5.11 Keep work areas clean, uncluttered and free of spills                            |

**COMPETENCY 2:** Service fuel injection pump assembly

| CONTENT<br>STANDARD<br>performance     | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|--|-----|--|--|
| 2 Service fuel injection pump assembly |     | 2.1 Remove fuel injection pump assembly      | 2.1.1 Type of hand tools<br>2.1.2 Type of high pressure pipes<br>2.1.3 Function out fuel injection pump assembly<br>2.1.4 Techniques of removing fuel injection pump assembly<br>2.1.5 Choose hand tools<br>2.1.6 Uninstall high pressure pipes connection<br>2.1.7 Move out fuel injection pump assembly<br>2.1.8 Apply technique of removing fuel injection pump assembly<br>2.1.9 Disconnect battery terminal before executing any works related to fuel system |
|  |     | 2.2 Clean external body                      | 2.2.1 Types of detergents<br>2.2.2 Types of cleaning tools<br>2.2.3 Using cotton rag to clean fuel injection pump body<br>2.2.4 Techniques of cleaning external body<br>2.2.5 Choose type of detergents<br>2.2.6 Determine type of cleaning tools<br>2.2.7 Use cotton rag to clean fuel injection pump body<br>2.2.8 Apply cleaning external body technique<br>2.2.9 Use non-flammable non-toxic proprietary solvents as cleaning agents                           |



|  |  |     |                                      |  |
|--|--|-----|--------------------------------------|--|
|  |  | 2.3 | Install fuel injection pump assembly | 2.3.1 Types of special tools<br>2.3.2 Procedures of setting fuel injection timing<br>2.3.3 Procedures reinstall fuel injection pump assembly<br>2.3.4 Methods of reinstalling high pressure pipes connection<br>2.3.5 Bleeding fuel system technique<br>2.3.6 Choose hand tools<br>2.3.7 Apply procedure of setting fuel injection timing<br>2.3.8 Follow procedure of reinstall fuel injection pump assembly<br>2.3.9 Determine reinstall high pressure pipes connection<br>2.3.10 Apply techniques of bleeding fuel system<br>2.3.11 Careful when doing bleeding works, fuel may splitting to the eyes |
|  |  | 2.4 | Test run engine                      | 2.4.1 Engine starting procedure<br>2.4.2 Leakage inspect procedure<br>2.4.3 Engine idling Revolution Per Minute(RPM)<br>2.4.4 Engine performance testing procedure<br>2.4.5 Updating log book<br>2.4.6 Apply engine starting procedure<br>2.4.7 Inspect engine leakage<br>2.4.8 Tune engine idling Revolution Per Minute(RPM)<br>2.4.9 Apply engine performance testing procedure<br>2.4.10 Update log book<br>2.4.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>2.4.12 Tidy up working area                                 |

**COMPETENCY 3 :** Repair fuel feed pump

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 3 Repair fuel feed pump            |     | 3.1 Obtain fuel feed pump service manual     | 3.1.1 Sources of fuel feed pump service manual<br>3.1.2 Procedures of acquiring fuel feed pump service manual<br>3.1.3 Fuel feed pump service manual<br>3.1.4 Determine source of fuel feed pump service manual<br>3.1.5 Acquire fuel feed pump service manual<br>3.1.6 Interpret fuel feed pump service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual |
|                                    |     | 3.2 Remove fuel feed pump assembly           | 3.2.1 Type of hand tools<br>3.2.2 Uninstall inlet and outlet pipes connection method<br>3.2.3 Procedures of removing fuel feed pump assembly<br>3.2.4 Choose hand tools<br>3.2.5 Uninstall inlet and outlet pipes connection<br>3.2.6 Follow procedure of removing fuel feed pump assembly<br>3.2.7 Disconnect negative battery terminal first  |
|                                    |     | 3.3 Dismantle fuel feed pump components      | 3.3.1 Function of hand tools<br>3.3.2 Procedures of dismantling fuel feed pump<br>3.3.3 Type of solvents<br>3.3.4 Methods of spraying parts<br>3.3.5 Choose hand tools<br>3.3.6 Apply procedure of dismantling fuel feed pump<br>3.3.7 Soak parts with solvent<br>3.3.8 Spray parts with pressure air.<br>3.3.9 Do not use petrol, paraffin or other solvent to remove oil from skin    |

|  |  |  |   |
|--|--|--|---|
|  |  | 3.4 Fuel feed pump components checked        | 3.4.1 Types of fuel feed pump parts defect<br>3.4.2 Techniques of measuring cam lobe from wear and tear<br>3.4.3 Methods of checking parts and component defect<br>3.4.4 Procedures of replacing defect parts<br>3.4.5 Visual check fuel feed pump parts defect<br>3.4.6 Measure cam lobe from wear and tear<br>3.4.7 Apply method of checking parts and component defect<br>3.4.8 Follow procedure of replacing defect parts<br>3.4.9 Accuracy in taking measured data   |
|  |  | 3.5 Assemble fuel feed pump components       | 3.5.1 Working principle of fuel feed pump<br>3.5.2 Techniques of assembling fuel feed pump component<br>3.5.3 Determine working principle of fuel feed pump<br>3.5.4 Apply technique of assembling fuel feed pump component<br>3.5.5 Accuracy in taking measured data   |
|  |  | 3.6 Install repaired fuel feed pump assembly | 3.6.1 Procedures of installing fuel feed pump assembly<br>3.6.2 Methods reinstalling inlet and outlet pipes connection<br>3.6.3 Techniques of testing fuel feed pump performance<br>3.6.4 Updating log book<br>3.6.5 Apply procedure of installing fuel feed pump assembly<br>3.6.6 Apply method of reinstalling inlet and outlet pipes connection<br>3.6.7 Apply techniques of testing fuel feed pump performance<br>3.6.8 Update log book<br>3.6.9 Accuracy when setting torque wrench<br>3.6.10 Careful when doing bleeding works, fuel may splitting to the eyes<br>3.6.11 Clean working area |

**COMPETENCY 4:** Service carburettor unit

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition  | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|---|---|
| 4<br>Service<br>carburettor unit   |     | 4.1<br>Obtain carburettor unit service manual | 4.1.1 Source of carburetor unit service manual<br>4.1.2 Procedures of acquiring carburetor unit service manual<br>4.1.3 Carburetor unit service manual<br>4.1.4 Determine source of carburetor unit service manual<br>4.1.5 Acquire carburetor unit service manual<br>4.1.6 Interpret carburetor unit service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual                                  |
|                                    |     | 4.2<br>Remove carburettor unit                | 4.2.1 Reason for disconnect battery terminal<br>4.2.2 Type of hand tools<br>4.2.3 Types of fuel pipes line<br>4.2.4 Types of carburetor unit<br>4.2.5 Removing carburetor procedure<br>4.2.6 Disconnect battery terminal<br>4.2.7 Choose hand tools<br>4.2.8 Disconnect fuel pipes line<br>4.2.9 Uninstall carburetor unit<br>4.2.10 Apply removing carburetor procedure<br>4.2.11 Disconnect negative battery terminal first |
|                                    |     | 4.3<br>Dismantle carburettor parts            | 4.3.1 Carburetor parts and components<br>4.3.2 Procedures of dismantling carburetor parts<br>4.3.3 Determine carburetor parts and components<br>4.3.4 Apply procedure of dismantling carburetor parts   |

|  |  |                               |   |
|--|--|-------------------------------|---|
|  |  | 4.4 Clean carburettor parts   | <p>4.4.1 Type of solvent</p> <p>4.4.2 Function of solvent</p> <p>4.4.3 Techniques of cleaning carburetor parts</p> <p>4.4.4 Spraying carburetor parts with pressure air</p> <p>4.4.5 Avoid spraying air to skin</p> <p>4.4.6 Choose type of solvent</p> <p>4.4.7 Soak carburetor parts with solvent</p> <p>4.4.8 Spray carburetor parts with pressure air</p> <p>4.4.9 Apply technique of cleaning carburetor parts</p> <p>4.4.10 Wear safety glasses with side guards when cleaning parts using compressed air</p> |
|  |  | 4.5 Assemble carburetor parts | <p>4.5.1 Carburetor parts and components</p> <p>4.5.2 Functions of carburetor parts</p> <p>4.5.3 Methods of assembling carburetor parts</p> <p>4.5.4 Changing parts with new carburetor repair kits</p> <p>4.5.5 Determine carburetor parts and components</p> <p>4.5.6 Determine reassemble carburetor parts</p> <p>4.5.7 Change parts with new carburetor repair kits</p> <p>4.5.8 Apply assembling carburetor parts method</p>   |
|  |  | 4.6 Install carburetor unit   | <p>4.6.1 Function of hand tools</p> <p>4.6.2 Function of carburetor unit</p> <p>4.6.3 Function of fuel pipes line</p> <p>4.6.4 Procedures of installing carburetor unit</p> <p>4.6.5 Choose hand tools</p> <p>4.6.6 Follow procedure of reinstall carburetor unit</p> <p>4.6.7 Reconnect fuel pipes line</p> <p>4.6.8 Reconnect battery terminal</p> <p>4.6.9 Apply installing carburetor unit procedure</p> <p>4.6.10 Do not use petrol, paraffin or other solvent to remove oil from skin</p>                     |

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|--|--|-----------------------------|--|
|  |  | 4.7 Test engine performance | <p>4.7.1 Engine starting procedure</p> <p>4.7.2 Leakage inspection procedure</p> <p>4.7.3 Engine idling Revolution Per Minute(RPM)</p> <p>4.7.4 Techniques of testing engine performance</p> <p>4.7.5 Updating log book</p> <p>4.7.6 Apply engine starting procedure</p> <p>4.7.7 Inspect engine leakage</p> <p>4.7.8 Tune engine idling Revolution Per Minute(RPM)</p> <p>4.7.9 Apply testing engine performance technique</p> <p>4.7.10 Update log book</p> <p>4.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>4.7.12 Tidy up working area</p> |
|--|--|-----------------------------|--|

**COMPETENCY 5:** Carry out removing engine assembly

| CONTENT<br>STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--------------------------------------|-----|--|---|
| 5 Carry out removing engine assembly |     | 5.1 Obtain job order                         | 5.1.1 Type of job order<br>5.1.2 Sourcing of job order form<br>5.1.3 Procedure to acquire job order<br>5.1.4 Determine type of job order<br>5.1.5 Source job order form<br>5.1.6 Apply procedure to acquire job order<br>5.1.7 Follow company procedure when obtain job order   |
|                                      |     | 5.2 Park agricultural machinery equipment    | 5.2.1 Type of agricultural machinery equipment<br>5.2.2 Parking agricultural machinery equipment procedure<br>5.2.3 Determine type of agricultural machinery equipment<br>5.2.4 Apply parking agricultural machinery equipment procedure<br>5.2.5 Meticulous when parking equipment   |
|                                      |     | 5.3 Remove external attachment               | 5.3.1 Type of hand tools<br>5.3.2 Type of battery terminals<br>5.3.3 Type of external attachment<br>5.3.4 Removing external attachment procedure<br>5.3.5 Choose hand tools<br>5.3.6 Disconnect battery terminals<br>5.3.7 Drain engine coolant<br>5.3.8 Disconnect related components connected to engine<br>5.3.9 Apply removing external attachment procedure<br>5.3.10 Disconnect negative battery terminal first |

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|--|--|----------------------------|---|
|  |  | 5.4 Remove engine assembly | <ul style="list-style-type: none"><li>5.4.1 Types of lifting equipment</li><li>5.4.2 Removing engine assembly procedure</li><li>5.4.3 Fix lifting equipment to engine</li><li>5.4.4 Support engine assembly with hydraulic jack</li><li>5.4.5 Apply removing engine assembly procedure</li><li>5.4.6 Place engine at save area</li><li>5.4.7 Do not wear rings, wristwatches, jewels and unbuttoned clothing.</li></ul> |
|--|--|----------------------------|---|



**COMPETENCY : 6** Carry out battery maintenance

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 6 Carry out battery maintenance             |            | 6.1 Obtain Battery Maintenance Service Manual        | 6.1.1 Sources of battery maintenance service manual<br>6.1.2 Procedure of acquiring battery maintenance service manual<br>6.1.3 Battery maintenance service manual<br>6.1.4 Determine source of battery maintenance service manual<br>6.1.5 Acquire battery maintenance service manual<br>6.1.6 Interpret battery maintenance service manual<br>6.1.7 Interpret battery maintenance circuit<br>6.1.8 Carefully read and observe precaution warnings given by manual   |
|   |            | 6.2 Execute Battery Maintenance Works                | 6.2.1 Types of battery terminal<br>6.2.2 Battery electrolyte specific gravity<br>6.2.3 Charging battery procedure<br>6.2.4 Battery terminal voltage<br>6.2.5 Disconnect battery terminal<br>6.2.6 Measure electrolyte specific gravity<br>6.2.7 Top up battery electrolyte<br>6.2.8 Charge wet cell battery<br>6.2.9 Measure battery terminal voltage<br>6.2.10 Connect battery terminal<br>6.2.11 Avoid splashes electrolyte to the skin, eyes and clothing<br>6.2.12 Meticulous when charging wet cell battery, its irritant and corrosive to skin, eyes, nose and throat |

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|--|--|------------------------------|---|
|  |  | 6.3 Test Battery Performance | <p>6.3.1 Testing battery performance method</p> <p>6.3.2 Engine idling Revolution Per Minute(RPM)</p> <p>6.3.3 Tuning engine idling Revolution Per Minute(RPM)</p> <p>6.3.4 Updating log book</p> <p>6.3.5 Apply testing battery performance method</p> <p>6.3.6 Inspect battery connection</p> <p>6.3.7 Tune engine idling Revolution Per Minute(RPM)</p> <p>6.3.8 Update log book</p> <p>6.3.9 Never run the engine in confined spaces which are not equipped with</p> <p>6.3.10 adequate ventilation for exhaust gas extraction</p> <p>6.3.11 Keep work areas clean, uncluttered and free of spills</p> <p>6.3.12 Tidy up working area</p> |
|--|--|------------------------------|---|

**COMPETENCY 7:** Replace electrical instruments and indicator

| <b>CONTENT<br/>STANDARD<br/>performance</b>    | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>           | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|--|------------|--|---|
| 7 Replace electrical instruments and indicator |            | 7.1 Obtain Electrical Instruments And Indicator Service Manual | <p>7.1.1 Sources of electrical instruments and indicator service manual</p> <p>7.1.2 Procedure of acquiring electrical instruments and indicator service manual</p> <p>7.1.3 Electrical instruments and indicator service manual</p> <p>7.1.4 Determine source of electrical instruments and indicator service manual</p> <p>7.1.5 Acquire electrical instruments and indicator service manual</p> <p>7.1.6 Interpret electrical instruments and indicator service manual</p> <p>7.1.7 Interpret electrical instruments and indicator circuit</p> <p>7.1.8 Carefully read and observe precaution warnings given by manual</p> |
|  |            | 7.2 Remove Electrical Instrument And Indicator Display         | <p>7.2.1 Types of electrical instruments and indicators display</p> <p>7.2.2 Function of electrical instruments and indicators display</p> <p>7.2.3 Procedure of removing electrical instruments and indicators display</p> <p>7.2.4 Determine types of electrical instruments and indicators display</p> <p>7.2.5 Determine function of electrical instruments and indicators display</p> <p>7.2.6 Apply removing electrical instruments and indicators display procedure</p> <p>7.2.7 Disconnect battery terminal before executing any works related to removing electrical instruments</p>                                 |

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|--|--|--|---|
|  |  | 7.3 Check Electrical Instrument And Indicator Function Ability | <p>7.3.1 Types of instrument and indicator defect</p> <p>7.3.2 Types of testing equipment</p> <p>7.3.3 Inspection of electrical instrument and indicator such as</p> <ul style="list-style-type: none"> <li>• gauges display</li> <li>• indicator display</li> <li>• meters display</li> </ul> <p>7.3.4 Determine types of instrument and indicator defect</p> <p>7.3.5 Choose types of testing equipment</p> <p>7.3.6 Inspect various gauges display at panel board</p> <p>7.3.7 Inspect various indicator display at panel board</p> <p>7.3.8 Inspect various meters display at panel board</p> <p>7.3.9 Handle electrical testing equipment with care</p> <p>7.3.10 Meticulous when connecting electrical testing equipment to electrical</p> <p>7.3.11 power source</p> |
|  |  | 7.4 Install Electrical Instrument And Indicator Display        | <p>7.4.1 Types of electrical instruments and indicators display</p> <p>7.4.2 Function of electrical instruments and indicators display</p> <p>7.4.3 Installing electrical instruments and indicators display procedure</p> <p>7.4.4 Determine types of electrical instruments and indicators display</p> <p>7.4.5 Determine function of electrical instruments and indicators display</p> <p>7.4.6 Apply installing electrical instruments and indicators display procedure</p>   |

**COMPETENCY 8:** Replace horns unit

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|--|--|
| 8<br>Replace horns<br>unit         |     | 8.1 Obtain Horn Maintenance Service Manual   | 8.1.1 Source of horn maintenance service manual<br>8.1.2 Procedure of acquiring horn maintenance service manual<br>8.1.3 Horn maintenance service manual<br>8.1.4 Determine source of horn maintenance service manual<br>8.1.5 Acquire horn maintenance service manual<br>8.1.6 Interpret horn maintenance service manual<br>8.1.7 Interpret horn electrical circuit<br>8.1.8 Carefully read and observe precaution warnings given by manual |
|                                    |     | 8.2 Remove Horn Unit                         | 8.2.1 Types of electrical circuit<br>8.2.2 Types of electrical equipment<br>8.2.3 Procedure of removing horn unit<br>8.2.4 Determine types of electrical circuit<br>8.2.5 Determine types of electrical equipment<br>8.2.6 Disconnect battery terminal<br>8.2.7 Uninstall horn unit<br>8.2.8 Disconnect negative battery terminal first  |
|                                    |     | 8.3 Install Horn Unit                        | 8.3.1 Types of horn circuit<br>8.3.2 Types of horn defect<br>8.3.3 Procedure of installing horn unit<br>8.3.4 Connecting battery terminal<br>8.3.5 Determine types of horn circuit<br>8.3.6 Determine types of horn defect<br>8.3.7 Fix new horn unit<br>8.3.8 Connect battery terminal<br>8.3.9 Connect positive battery terminal first   |

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|--|--|---------------------------|---|
|  |  | 8.4 Test Horn Performance | <p>8.4.1 Horn testing procedure</p> <p>8.4.2 Updating log book</p> <p>8.4.3 Checking battery connection</p> <p>8.4.4 Try horn functional ability</p> <p>8.4.5 Apply horn testing procedure</p> <p>8.4.6 Inspect battery connection</p> <p>8.4.7 Try horn functional ability</p> <p>8.4.8 Update log book</p> <p>8.4.9 Meticulous when filling service checklist form</p> <p>8.4.10 Keep work areas clean, uncluttered and free of spills</p> <p>8.4.11 Tidy up working area</p> |
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**COMPETENCY 9:** Replace viper motor

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 9<br>Replace viper<br>motor        |     | 9.1<br>Obtain Wiper Motor Service<br>Manual  | 9.1.1 Source of wiper motor service manual<br>9.1.2 Procedure of acquiring wiper motor service manual<br>9.1.3 Wiper motor service manual<br>9.1.4 Interpreting wiper motor electrical circuit<br>9.1.5 Determine source of wiper motor service manual<br>9.1.6 Acquire wiper motor service manual<br>9.1.7 Interpret wiper motor service manual<br>9.1.8 Interpret wiper motor electrical circuit<br>9.1.9 Carefully read and observe precaution warnings given by manual    |
|                                    |     | 9.2<br>Remove Wiper Motor                    | 9.2.1 Types of electrical circuit<br>9.2.2 Types of electrical equipment<br>9.2.3 Wiper relay's function<br>9.2.4 Procedure of removing wiper motor unit<br>9.2.5 Determine types of electrical circuit<br>9.2.6 Determine types of electrical equipment<br>9.2.7 Determine wiper relay's function<br>9.2.8 Disconnect battery terminal<br>9.2.9 Uninstall wiper motor unit<br>9.2.10 Disconnect negative battery terminal first<br>9.2.11 Patient when working at tight area |

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|  |  | 9.3 Install Wiper Motor         | <p>9.3.1 Types of wiper motor circuit</p> <p>9.3.2 Types of wiper motor defect</p> <p>9.3.3 Procedure of installing wiper motor unit</p> <p>9.3.4 Determine types of wiper motor circuit</p> <p>9.3.5 Determine types of wiper motor defect</p> <p>9.3.6 Reinstall wiper motor unit</p> <p>9.3.7 Connect battery terminal</p> <p>9.3.8 Connect positive battery terminal first</p>   |
|  |  | 9.4 Test Wiper Motor Operations | <p>9.4.1 Wiper motor testing procedure</p> <p>9.4.2 Ohm's law</p> <p>9.4.3 Updating log book</p> <p>9.4.4 Apply wiper motor testing procedure</p> <p>9.4.5 Inspect battery connection</p> <p>9.4.6 Try wiper motor functional ability at intermitted, low and high position</p> <p>9.4.7 Update log book</p> <p>9.4.8 Meticulous when filling service checklist form</p> <p>9.4.9 Keep work areas clean, uncluttered and free of spills</p> <p>9.4.10 Tidy up working area</p>                     |
|  |  | 9.5 Install inlet manifold      | <p>2.7.1 Identify Types of Inlet manifold gasket</p> <p>2.7.2 Explain Function of Inlet manifold gasket</p> <p>2.7.3 Describe Procedure of installing Inlet manifold</p> <p>2.7.4 Explain Reinstall inlet manifold</p> <p>2.7.5 Determine types of Inlet manifold gasket</p> <p>2.7.6 Determine function of Inlet manifold gasket</p> <p>2.7.7 Technique of reinstall inlet manifold</p> <p>2.7.8 Apply method of installing Inlet manifold procedure</p> <p>2.7.9 Careful when placing gasket</p> |



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|--|--|-------------------------|--|
|  |  | 9.6 Test exhaust system | <p>2.8.1 Engine starting procedure</p> <p>2.8.2 Exhaust leakage inspection procedure</p> <p>2.8.3 Method of testing exhaust system</p> <p>2.8.4 Updating log book</p> <p>2.8.5 Apply engine starting procedure</p> <p>2.8.6 Inspect manifolds' leakage</p> <p>2.8.7 Apply testing exhaust system method</p> <p>2.8.8 Update log book</p> <p>2.8.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>2.8.10 Tidy up working area</p> |
|--|--|-------------------------|--|

**COMPETENCY 10 :** Replace capacitor discharge ignition unit (CDI unit)

| <b>CONTENT<br/>STANDARD<br/>performance</b>             | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>         | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 10 Replace capacitor discharge ignition unit (CDI unit) |            | 10.1 Obtain Capacitor Discharge Ignition Unit Service Manual | 10.1.1 Sources of capacitor discharge ignition unit service manual<br>10.1.2 Procedure of acquiring capacitor discharge ignition unit service manual<br>10.1.3 Capacitor discharge ignition unit service manual<br>10.1.4 Determine source of capacitor discharge ignition unit service manual<br>10.1.5 Acquire capacitor discharge ignition unit service manual<br>10.1.6 Interpret capacitor discharge ignition unit service manual<br>10.1.7 Interpret capacitor discharge ignition unit system circuit<br>10.1.8 Carefully read and observe precaution warnings given by manual  |
|   |            | 10.2 Check Capacitor Discharge Ignition Unit Default         | 10.2.1 Types of capacitor discharge ignition unit<br>10.2.2 Function of capacitor discharge ignition unit<br>10.2.3 Location of capacitor discharge ignition unit<br>10.2.4 Types of capacitor discharge ignition unit default<br>10.2.5 Checking capacitor discharge ignition unit procedure<br>10.2.6 Determine types of capacitor discharge ignition unit<br>10.2.7 Determine function of capacitor discharge ignition unit<br>10.2.8 Determine location of capacitor discharge ignition unit<br>10.2.9 Determine types of capacitor discharge ignition unit default<br>10.2.10 Choose inspection equipments<br>10.2.11 Apply checking capacitor discharge ignition unit procedure<br>10.2.12 Meticulous when using inspection equipment |

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|  |  | 10.3 Remove Capacitor Discharge Ignition Unit          | <p>10.3.1 Types of capacitor discharge ignition unit</p> <p>10.3.2 Replacing capacitor discharge ignition unit procedure</p> <p>10.3.3 Determine types of lighting system components</p> <p>10.3.4 Uninstall capacitor discharge ignition unit</p> <p>10.3.5 Disconnect wire from CDI unit</p> <p>10.3.6 Loosen the screw from CDI unit</p> <p>10.3.7 Apply replacing capacitor discharge ignition unit procedure</p> <p>10.3.8 Meticulous when disconnect wire from CDI unit</p>   |
|  |  | 10.4 Install Capacitor Discharge Ignition Unit         | <p>10.4.1 Function of capacitor discharge ignition unit</p> <p>10.4.2 Procedure of installing capacitor discharge ignition unit</p> <p>10.4.3 Determine function of capacitor discharge ignition unit</p> <p>10.4.4 Installing capacitor discharge ignition unit procedure</p> <p>10.4.5 Set correct timing</p> <p>10.4.6 Move exciter coil to suit the timing</p> <p>10.4.7 Bring its mark matching face into register</p> <p>10.4.8 Loosen the screw allowed to be shifted</p> <p>10.4.9 Tighten the screw to CDI unit</p> <p>10.4.10 Connect all wire</p> <p>10.4.11 Meticulous when installing CDI unit</p> |
|  |  | 10.5 Test Capacitor Discharge Ignition Unit Operations | <p>10.5.1 Types of capacitor discharge ignition unit</p> <p>10.5.2 Inspection of functionality capacitor discharge ignition unit method</p> <p>10.5.3 Updating log book</p> <p>10.5.4 Determine functionality of capacitor discharge ignition unit</p> <p>10.5.5 Apply inspection of functionality capacitor discharge ignition unit method</p> <p>10.5.6 Update log book</p> <p>10.5.7 Meticulous when filling service checklist form</p> <p>10.5.8 Keep work areas clean, uncluttered and free of spills</p> <p>10.5.9 Tidy up working area</p>   |

# **COMPETENCY 11: Repair lighting system**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 11 Repair lighting system                   |            | 11.1 Obtain Lighting System Service Manual           | 11.1.1 Sources of lighting system service manual<br>11.1.2 Procedure of acquiring lighting system service manual<br>11.1.3 Lighting system service manual<br>11.1.4 Determine source of lighting system service manual<br>11.1.5 Acquire lighting system service manual<br>11.1.6 Interpret lighting system service manual<br>11.1.7 Interpret lighting system circuit<br>11.1.8 Carefully read and observe precaution warnings given by manual   |
|   |            | 11.2 Check Lighting System Components                | 11.2.1 Types of various light system<br>11.2.2 Function of lighting system components such as <ul style="list-style-type: none"> <li>• Bulbs</li> <li>• Fuses</li> <li>• Relays</li> <li>• Switches</li> </ul> 11.2.3 Types of lighting system testing instrument<br>11.2.4 Types of lighting system default<br>11.2.5 Checking lighting system component procedure<br>11.2.6 Types of various light system<br>11.2.7 Inspect function of lighting system components<br>11.2.8 Choose types of lighting system testing instrument<br>11.2.9 Determine types of lighting system default<br>11.2.10 Apply checking lighting system component procedure<br>11.2.11 Avoid temporary use others conductor material like wire, to replace fuses |

**COMPETENCY 12:** Replace exhaust unit

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 12 Replace exhaust unit                     |            | 12.1 Obtain exhaust system service manual            | 12.1.1 List Source of exhaust system service manual<br>12.1.2 Explain Procedures of acquiring exhaust system service manual<br>12.1.3 Exhaust system service manual<br>12.1.4 Determine source of exhaust system service manual<br>12.1.5 Acquire exhaust system service manual<br>12.1.6 Interpret exhaust system service manual<br>12.1.7 Carefully read and observe precaution warnings given by manual      |
|   |            | 12.2 Remove exhaust unit                             | 12.2.1 Identify Types of exhaust silencer<br>12.2.2 Describe Function of exhaust silencer<br>12.2.3 Describe Procedure of removing exhaust unit<br>12.2.4 Determine types of exhaust silencer<br>12.2.5 Determine function of exhaust silencer<br>12.2.6 Apply procedure of removing exhaust unit<br>12.2.7 Disconnect exhaust unit from exhaust manifold<br>12.2.8 Meticulous when working with hot components |

|  |  |                           |  |
|--|--|---------------------------|--|
|  |  | 12.3 Install exhaust unit | 12.3.1 Identify Types of exhaust gasket<br>12.3.2 Explain Function of exhaust gasket<br>12.3.3 State Procedures of installing exhaust unit<br>12.3.4 Determine types of exhaust gasket<br>12.3.5 Determine function of exhaust gasket<br>12.3.6 Apply procedure of installing exhaust unit<br>12.3.7 Place exhaust gasket at location<br>12.3.8 Fix exhaust unit to exhaust manifold<br>12.3.9 Careful when placing gasket |
|  |  | 12.4 Test exhaust leakage | 12.4.1 Describe Procedure of engine starting<br>12.4.2 Describe Procedure of exhaust leakage inspection<br>12.4.3 Updating log book<br>12.4.4 Apply procedure of engine starting procedure<br>12.4.5 Install exhaust leakage<br>12.4.6 Update log book<br>12.4.7 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>12.4.8 Tidy up working area        |

**COMPETENCY 13:** Replace intake & exhaust manifold

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 13 Replace intake & exhaust manifold        |            | 13.1 Obtain inlet & exhaust system service manual    | 13.1.1 Identify Source of inlet & exhaust system service manual<br>13.1.2 Explain Procedures of acquiring inlet & exhaust system service manual<br>13.1.3 Identify Inlet & exhaust system service manual<br>13.1.4 Determine source of inlet & exhaust system service manual<br>13.1.5 Acquire inlet & exhaust system service manual<br>13.1.6 Interpret inlet & exhaust system service manual<br>13.1.7 Carefully read and observe precaution warnings given by manual |

|  |  |                                 |  |
|--|--|---------------------------------|--|
|  |  | 13.2 Remove external attachment | 13.2.1 Explain Function of air intake system assembly<br>13.2.2 Identify Types of exhaust piping and muffler<br>13.2.3 Describe Procedures of removing external attachment<br>13.2.4 Describe Methods of disconnect turbo charger assembly from exhaust manifold<br>13.2.5 Disconnect air intake system assembly<br>13.2.6 Disconnect exhaust piping and muffler<br>13.2.7 Disconnect turbo charger assembly from exhaust manifold<br>13.2.8 Apply procedure of removing external attachment |
|  |  | 13.3 Remove inlet manifold      | 13.3.1 Types of manifolds<br>13.3.2 Function of inlet manifold<br>13.3.3 Procedure of removing inlet manifold<br>13.3.4 Determine types of manifolds<br>13.3.5 Determine function of inlet manifold<br>13.3.6 Uninstall inlet manifold<br>13.3.7 Patient when working at tight area  |
|  |  | 13.4 Remove exhaust manifold    | 13.4.1 Identify Types of manifolds<br>13.4.2 Describe Function of exhaust manifold<br>13.4.3 Describe Procedure of removing exhaust manifold<br>13.4.4 Determine types of manifolds<br>13.4.5 Determine function of exhaust manifold<br>13.4.6 Uninstall exhaust manifold<br>13.4.7 Careful when handling hot components   |
|  |  | 13.5 Check manifold face        | 13.5.1 Identify Types of manifolds defect<br>13.5.2 Describe Method of checking manifold face from distortion<br>13.5.3 Visualizing of checking manifold from crack<br>13.5.4 Determine types of manifolds defect<br>13.5.5 Visual check manifold from crack<br>13.5.6 Inspect manifolds face from distortion<br>13.5.7 Conscientious when measure wear parts  |



|  |  |                               |   |
|--|--|-------------------------------|---|
|  |  | 13.6 Install exhaust manifold | 13.6.1 Identify Types of exhaust manifold gasket<br>13.6.2 State Function of exhaust manifold gasket<br>13.6.3 Explain Procedure of installing exhaust manifold<br>13.6.4 Determine types of exhaust manifold gasket<br>13.6.5 Determine function of exhaust manifold gasket<br>13.6.6 Method of reinstalling exhaust manifold<br>13.6.7 Apply installing exhaust manifold procedure<br>13.6.8 Careful when placing gasket  |
|  |  | 13.7 Install inlet manifold   | 13.7.1 Identify Types of Inlet manifold gasket<br>13.7.2 Explain Function of Inlet manifold gasket<br>13.7.3 Describe Procedure of installing Inlet manifold<br>13.7.4 Explain Reinstall inlet manifold<br>13.7.5 Determine types of Inlet manifold gasket<br>13.7.6 Determine function of Inlet manifold gasket<br>13.7.7 Technique of reinstall inlet manifold<br>13.7.8 Apply method of installing Inlet manifold procedure<br>13.7.9 Careful when placing gasket        |
|  |  | 13.8 Test exhaust system      | 13.8.1 Engine starting procedure<br>13.8.2 Exhaust leakage inspection procedure<br>13.8.3 Method of testing exhaust system<br>13.8.4 Updating log book<br>13.8.5 Apply engine starting procedure<br>13.8.6 Inspect manifolds' leakage<br>13.8.7 Apply testing exhaust system method<br>13.8.8 Update log book<br>13.8.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>13.8.10 Tidy up working area |

DRAFT

MINISTRY OF EDUCATION, MALAYSIA  
CURRICULUM DEVELOPMENT DIVISION  
VOCATIONAL COLLEGE STANDARD CURRICULLUM

**MODULE INFORMATION**

Confidential

**MODULE** : COOLING AND LUBRICATION SYSTEM MAINTENANCE  
**MODULE CODE** : CAAM 103  
**LEVEL** : 1  
**SEMESTER** : 1  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 5 hr/week (P)  
6 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Replace thermostat unit
- Replace water pump
- Service radiator assembly
- Carry out cooling system flushing works
- Service oil cooler unit
- Replace oil pressure unit
- Carry out engine greasing
- Replace engine oil pump

## MODULE DESCRIPTION

This unit identifies the competence required to replace thermostat unit using hand tool set, new thermostat unit, cooling system service manual, grease and container so that cooling system service manual obtained, engine coolant drained, thermostat unit removed, thermostat unit installed, engine coolant refilled and cooling system performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to replace water pump using hand tools set, gasket, new water pump unit, container and cooling system service manual cooling system service manual identified, engine coolant drained, fan assembly and water pump assembly removed, new water pump assembly and fan assembly installed, engine coolant refilled and cooling system performance tested in accordance with manufacturer's specification

This unit identifies the competence required to service radiator assembly using hand tools set, cooling system service manual, coolant, soldering iron, lead and air compressor so that cooling system service manual obtained, engine coolant drained, radiator unit removed, radiator servicing works executed, radiator unit installed, engine coolant refilled and cooling system performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to carry out cooling system flushing works using hand tools set, flushing machine, radiator cleaner, flushing works service manual RPM meter and log book and so that flushing works service manual obtained, thermostat unit removed, flushing works executed, thermostat unit install, engine performance tested run in accordance with manufacturer's specification.

This unit identifies the competence required to Service oil cooler unit using hand tools set, oil cooler service manual, solvent, pressure tester, torque wrench, gasket, RPM Meter and log book so that oil cooler service manual obtained, oil cooler removed, flushing works executed, oil cooler installed and engine performance tested run in accordance with manufacturer's specification.

This unit identifies the competence required to replace oil pressure unit using hand tools set, new oil pressure unit, white tape and pressure unit service manual so that pressure unit service manual obtained, external attachments and oil pressure unit removed, oil pressure unit checked, oil pressure unit installed and oil pressure system tested in accordance with manufacturer's specification.

This unit identifies the competence required to carry out engine greasing using hand tools set, grease gun, grease and machines service manual so that machines service manual obtained, machine parts greased and service checklist recorded in accordance with manufacturer's specifications.

This unit identifies the competence required to **replace** engine oil pump using hand tools set, torque wrench, straight edge, machines service manual, gasket and oil pump repair kit so that machines service manual obtained, lubrication oil drained, oil sump and oil pump assembly removed, oil pump assembly cleaned, oil pump assembly and oil sump installed and oil pressure tested in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 3: COOLING AND LUBRICATION SYSTEM MAINTENANCE

#### COMPETENCY 1: Replace thermostat unit

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 1. Replace thermostat unit      |     | 1.1 Obtain cooling system service manual     | 1.1.1 Sources of cooling system service manual<br>1.1.2 Procedures of acquiring cooling system service manual<br>1.1.3 Cooling system service manual<br>1.1.4 Determine source of cooling system service manual<br>1.1.5 Acquire cooling system service manual<br>1.1.6 Interpret cooling system service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual                                     |
|                                 |     | 1.2 Drain engine coolant                     | 1.2.1 Types of engine cooling system<br>1.2.2 Functions of engine coolant<br>1.2.3 Functions of radiator cap<br>1.2.4 Procedures of draining engine coolant<br>1.2.5 Determine type of engine cooling system<br>1.2.6 Determine function of engine coolant<br>1.2.7 Open radiator cap<br>1.2.8 Unscrew draining cork<br>1.2.9 Always loosen the radiator cap very slowly before removing it to allow pressure in the system |

|  |  |                             |  |
|--|--|-----------------------------|--|
|  |  | 1.3 Remove thermostat unit  | 1.3.1 Identify Types of radiator hose<br>1.3.2 Removing thermostat housing<br>1.3.3 Basic operation of thermostat unit<br>1.3.4 Taking out thermostat unit<br>1.3.5 Determine types of radiator hose<br>1.3.6 Uninstall radiator hose from thermostat housing<br>1.3.7 Disassemble radiator housing<br>1.3.8 Take out thermostat unit<br>1.3.9 Meticulous when working with hot components |
|  |  | 1.4 Install thermostat unit | 1.4.1 Describe Function of thermostat unit<br>1.4.2 Reassembling radiator housing procedure<br>1.4.3 Techniques of fixing radiator hose<br>1.4.4 Plug thermostat unit<br>1.4.5 Reassemble radiator housing<br>1.4.6 Fix radiator hose to thermostat housing<br>1.4.7 Ensure thermostat is placing at the right side  |
|  |  | 1.5 Refill engine coolant   | 1.5.1 Types of engine coolant<br>1.5.2 Functions of engine coolant<br>1.5.3 Explain Functions of radiator cap<br>1.5.4 Describe Procedures of draining engine coolant<br>1.5.5 Determine types of engine coolant<br>1.5.6 Screw draining cork<br>1.5.7 Close radiator cap<br>1.5.8 Top up engine coolant<br>1.5.9 Avoid splash coolant to floor  |

|  |  |                                     |   |
|--|--|-------------------------------------|---|
|  |  | 1.6 Test cooling system performance | <p>1.6.1 Explain Procedures of engine starting</p> <p>1.6.2 Explain Procedures of leakage inspection</p> <p>1.6.3 Identify Engine working temperature</p> <p>1.6.4 Identify Updating log book</p> <p>1.6.5 Apply engine starting procedure</p> <p>1.6.6 Inspect engine leakage</p> <p>1.6.7 Compare engine temperature with service manual</p> <p>1.6.8 Update log book</p> <p>1.6.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>1.6.10 Tidy up working area</p> |
|--|--|-------------------------------------|---|



**COMPETENCY 2:** Replace water pump

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 2. Replace water pump           |     | 2.1 Identify cooling system service manual   | 2.1.1 Explain Sources of cooling system service manual<br>2.1.2 Explain Procedures of acquiring cooling system service manual<br>2.1.3 Identify Cooling system service manual<br>2.1.4 Determine source of cooling system service manual<br>2.1.5 Acquire cooling system service manual<br>2.1.6 Interpret cooling system service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual  |
|                                 |     | 2.2 Drain engine coolant                     | 2.2.1 Identify Types of engine coolant<br>2.2.2 Explain Functions of engine coolant<br>2.2.3 Explain Functions of radiator cap<br>2.2.4 Describe Procedures of draining engine coolant<br>2.2.5 Determine types of engine coolant<br>2.2.6 Determine function of engine coolant<br>2.2.7 Open radiator cap<br>2.2.8 Unscrew draining cork<br>2.2.9 Apply procedure of draining engine coolant<br>2.2.10 Always loosen the radiator cap very slowly before removing it |

|  |  |                                |  |
|--|--|--------------------------------|--|
|  |  | 2.3 Remove fan assembly        | <p>2.3.1 Identify Types of fan</p> <p>2.3.2 Explain Function of fan</p> <p>2.3.3 Describe Procedures of removing fan assembly</p> <p>2.3.4 Identify Loosen fan belt tension</p> <p>2.3.5 Uninstall fan assembly unit</p> <p>2.3.6 Determine types of fan</p> <p>2.3.7 Determine uninstall fan cover</p> <p>2.3.8 Determine loosen fan belt tension</p> <p>2.3.9 Method of uninstalling fan assembly unit</p> <p>2.3.10 Apply procedure of removing fan assembly</p> <p>2.3.11 Use proper PPE</p> |
|  |  | 2.4 Remove water pump assembly | <p>2.4.1 Identify Types of water pump</p> <p>2.4.2 List Function of water pump</p> <p>2.4.3 Explain Procedures of removing water pump</p> <p>2.4.4 Explain Methods of loosening water pump bolts</p> <p>2.4.5 Determine types of water pump</p> <p>2.4.6 Loosen water pump bolts</p> <p>2.4.7 Follow technique of uninstalling water pump unit</p> <p>2.4.8 Apply procedure of removing water pump</p> <p>2.4.9 Do not wear rings, wristwatches, jewels and unbuttoned clothing</p>              |
|  |  | 2.5 Install fan assembly       | <p>2.5.1 Identify Types of water pump gasket</p> <p>2.5.2 Describe Function of water pump gasket</p> <p>2.5.3 Reinstall new water pump unit</p> <p>2.5.4 Explain Techniques of tightening water pump bolt</p> <p>2.5.5 Place new water pump gasket</p> <p>2.5.6 Method of reinstalling new water pump unit</p> <p>2.5.7 Follow technique of tightening water pump bolt</p> <p>2.5.8 Install New Water Pump Assembly</p> <p>2.5.9 Use proper PPE</p>  |

|  |  |                                     |  |
|--|--|-------------------------------------|--|
|  |  | 2.6 Refill engine coolant           | 2.6.1 Identify Types of fan belt<br>2.6.2 Explain Procedures of installing fan assembly<br>2.6.3 Describe Methods of setting fan belt tension<br>2.6.4 Describe Measuring fan belt tension<br>2.6.5 Reinstall fan assembly unit<br>2.6.6 Reinstall fan cover and belt<br>2.6.7 Measure fan belt tension<br>2.6.8 Apply procedure of installing fan assembly<br>2.6.9 Patient when working at tight area  |
|  |  | 2.7 Test cooling system performance | 2.7.1 Identify Types of engine coolant<br>2.7.2 Explain Functions of engine coolant<br>2.7.3 Explain Functions of radiator cap<br>2.7.4 Describe Procedures of draining engine coolant<br>2.7.5 Screwing draining cork<br>2.7.6 Determine types of engine coolant<br>2.7.7 Screw draining cork<br>2.7.8 Close radiator cap<br>2.7.9 Top up engine coolant<br>2.7.10 Apply procedure of draining engine coolant<br>2.7.11 Avoid splash coolant to floor |

**COMPETENCY 3: Service radiator assembly**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 3. Service radiator assembly    |     | 3.1 Obtain cooling system service manual     | 3.1.1 Source of cooling system service manual<br>3.1.2 Procedures of acquiring cooling system service manual<br>3.1.3 Cooling system service manual<br>3.1.4 Determine source of cooling system service manual<br>3.1.5 Acquire cooling system service manual<br>3.1.6 Interpret cooling system service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 3.2 Drain engine coolant                     | 3.2.1 Identify Types of engine coolant<br>3.2.2 Explain Functions of engine coolant<br>3.2.3 Explain Functions of radiator cap<br>3.2.4 Describe Procedures of draining engine coolant<br>3.2.5 Determine types of engine coolant<br>3.2.6 Determine function of engine coolant<br>3.2.7 Open radiator cap<br>3.2.8 Unscrew draining cork<br>3.2.9 Always loosen the radiator cap very slowly before removing it to allow pressure in the system |
|                                 |     | 3.3 Remove radiator unit                     | 3.3.1 Explain Functions of radiator unit<br>3.3.2 Disconnecting upper and lower water hose technique<br>3.3.3 Describe Procedures of removing radiator unit<br>3.3.4 Determine function of radiator unit<br>3.3.5 Disconnect upper and lower water hose<br>3.3.6 Uninstall radiator unit from engine<br>3.3.7 Apply procedure of removing radiator<br>3.3.8 Careful when handling radiator fin   |

|  |  |                                      |  |
|--|--|--------------------------------------|--|
|  |  | 3.4 Execute radiator servicing works | <p>3.4.1 Identify Types of radiator defects</p> <p>3.4.2 Describe Pressuring test procedure</p> <p>3.4.3 Explain Soldering radiator core, upper and lower tank procedure</p> <p>3.4.4 Explain Cleaning radiator fin technique</p> <p>3.4.5 Determine types of radiator defects</p> <p>3.4.6 Apply pressuring test procedure</p> <p>3.4.7 Solder radiator core, upper and lower tank</p> <p>3.4.8 Blow radiator fin with pressure air</p> <p>3.4.9 Brush hard body with detergent</p> <p>3.4.10 Apply cleaning radiator fin technique</p> <p>3.4.11 Meticulous when working with hot components</p> |
|  |  | 3.5 Install radiator unit            | <p>3.5.1 Explain Function of radiator unit</p> <p>3.5.2 Describe Procedures of installing radiator unit</p> <p>3.5.3 Identify Techniques of connecting upper and lower water hose</p> <p>3.5.4 Describe Methods of reinstall radiator unit to engine</p> <p>3.5.5 Determine function of radiator unit</p> <p>3.5.6 Methods of reinstall radiator unit to engine</p> <p>3.5.7 Reconnect upper and lower water hose</p> <p>3.5.8 Follow procedure of installing radiator</p> <p>3.5.9 Patient when working at tight area</p>   |
|  |  | 3.6 Refill engine coolant            | <p>3.6.1 Identify Types of engine coolant</p> <p>3.6.2 Describe Functions of engine coolant</p> <p>3.6.3 Describe Functions of radiator cap</p> <p>3.6.4 Explain Draining engine coolant procedure</p> <p>3.6.5 Determine types of engine coolant</p> <p>3.6.6 Screw draining cork</p> <p>3.6.7 Close radiator cap</p> <p>3.6.8 Top up engine coolant</p> <p>3.6.9 Avoid splash coolant to floor</p>   |

|  |  |                                     |  |
|--|--|-------------------------------------|--|
|  |  | 3.7 Test cooling system performance | <p>4.7.1 Explain Engine starting procedure</p> <p>4.7.2 Describe Leakage inspect procedure</p> <p>4.7.3 Define Engine working temperature</p> <p>4.7.4 State Techniques of testing cooling system performance</p> <p>4.7.5 Updating log book</p> <p>4.7.6 Apply engine starting procedure</p> <p>4.7.7 Inspect engine leakage</p> <p>4.7.8 Compare engine temperature with service manual</p> <p>4.7.9 Follow technique of testing cooling system performance</p> <p>4.7.10 Update log book</p> <p>4.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>4.7.12 Tidy up working area</p> |
|--|--|-------------------------------------|--|

**COMPETENCY : 4** Carry out **cooling** system flushing works

| CONTENT<br>STANDARD<br>performance                | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---|-----|--|--|
| 4. Carry out <b>cooling</b> system flushing works |     | 4.1 Obtain flushing works service manual     | 4.1.1 Identify Sources of flushing works service manual<br>4.1.2 Describe Procedures of acquiring flushing works service manual<br>4.1.3 Identify Flushing works service manual<br>4.1.4 Determine source of flushing works service manual<br>4.1.5 Acquire flushing works service manual<br>4.1.6 Interpret flushing works service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual   |
|   |     | 4.2 Remove thermostat unit                   | 4.2.1 Identify Types of radiator hose<br>4.2.2 Explain Methods of removing thermostat housing<br>4.2.3 Describe Basic operation of thermostat unit<br>4.2.4 State Taking out thermostat unit<br>4.2.5 Determine types of radiator hose<br>4.2.6 Uninstall radiator hose from thermostat housing<br>4.2.7 Disassemble radiator housing<br>4.2.8 Take out thermostat unit<br>4.2.9 Always loosen the radiator cap very slowly before removing it to allow pressure in the system |
|   |     | 4.3 Execute flushing works                   | 4.3.1 Explain Purpose of flushing works<br>4.3.2 State Types of flushing machine<br>4.3.3 Describe Procedures of flushing works<br>4.3.4 Determine purpose of flushing works<br>4.3.5 Fix flushing machine to cooling system<br>4.3.6 Apply procedure of flushing works<br>4.3.7 Meticulous when using flushing chemical   |

|  |  |                                 |   |
|--|--|---------------------------------|---|
|  |  | 4.4 Install thermostat unit     | <p>4.4.1 Explain Function of thermostat unit</p> <p>4.4.2 Explain Procedures of reassembling radiator housing</p> <p>4.4.3 Describe Techniques of fixing radiator hose</p> <p>4.4.4 Plug thermostat unit</p> <p>4.4.5 Reassemble radiator housing</p> <p>4.4.6 Fix radiator hose to thermostat housing</p> <p>4.4.7 Ensure thermostat is placing at the right side</p>  |
|  |  | 4.5 Test run engine performance | <p>4.5.1 Explain Procedures of engine starting</p> <p>4.5.2 Explain Procedures of leakage inspection</p> <p>4.5.3 Define Engine working temperature</p> <p>4.5.4 Describe Methods of testing engine performance</p> <p>4.5.5 Updating log book</p> <p>4.5.6 Checking engine leakage</p> <p>4.5.7 Apply procedure engine starting</p> <p>4.5.8 Inspect engine leakage</p> <p>4.5.9 Compare engine temperature with service manual</p> <p>4.5.10 Tune engine idling revolution per minute(RPM)</p> <p>4.5.11 Apply method of testing engine performance</p> <p>4.5.12 Update log book</p> <p>4.5.13 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>4.5.14 Never bring head, body, arm, leg and fingers near fans or rotating belts</p> <p>4.5.15 Tidy up working area</p> |



**COMPETENCY 5: Service** oil cooler unit

| CONTENT STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|-----------------------------------|-----|--|---|
| 5. <b>Service</b> oil cooler unit |     | 5.1 Obtain oil cooler service manual         | 5.1.1 Identify Source of oil cooler service manual<br>5.1.2 Describe Procedures of acquiring oil cooler service manual<br>5.1.3 State Oil cooler service manual<br>5.1.4 Determine source of oil cooler service manual<br>5.1.5 Acquire oil cooler service manual<br>5.1.6 Interpret oil cooler service manual<br>5.1.7 Carefully read and observe precaution warnings given by manual  |
|                                   |     | 5.2 Remove oil cooler                        | 5.2.1 Explain Operation of oil cooler<br>5.2.2 Explain Function of oil cooler<br>5.2.3 Describe Procedures of removing oil cooler<br>5.2.4 Determine operation of oil cooler<br>5.2.5 Determine function of oil cooler<br>5.2.6 Uninstall oil cooler from engine<br>5.2.7 Careful when handling hot components  |
|                                   |     | 5.3 Execute flushing works                   | 5.3.1 Identify Types of flushing fluid<br>5.3.2 Identify Types of oil cooler defects<br>5.3.3 Describe Procedures of flushing oil cooler<br>5.3.4 Identify Oil cooler pressure test<br>5.3.5 Determine types of flushing fluid<br>5.3.6 Determine types of oil cooler defects<br>5.3.7 Follow procedure of flushing oil cooler<br>5.3.8 Apply method of oil cooler pressure test<br>5.3.9 Meticulous when using flushing chemical |

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|  |  | 5.4 Install oil cooler          | 5.4.1 Identify Operation of oil cooler<br>5.4.2 Explain Function of oil cooler<br>5.4.3 Describe Procedures of installing oil cooler<br>5.4.4 Determine operation of oil cooler<br>5.4.5 Determine function of oil cooler<br>5.4.6 Follow procedure of reinstalling oil cooler to engine<br>5.4.7 Meticulous when working with hot components  |
|  |  | 5.5 Test run engine performance | 5.5.1 Explain Engine starting procedure<br>5.5.2 Describe Leakage inspect procedure<br>5.5.3 Identify Engine working temperature<br>5.5.4 Describe Methods of testing engine performance<br>5.5.5 Updating log book<br>5.5.6 Apply engine starting procedure<br>5.5.7 Inspect engine leakage<br>5.5.8 Compare engine temperature with service manual<br>5.5.9 Apply testing engine performance method<br>5.5.10 Update log book<br>5.5.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>5.5.12 Tidy up working area |

# **COMPETENCY 6: Replace oil pressure unit**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 6. Replace oil pressure unit                |            | 6.1 Obtain pressure unit service manual              | 6.1.1 Describe Sources of cooling system service manual<br>6.1.2 Explain Procedures of acquiring cooling system service manual<br>6.1.3 Explain system service manual<br>6.1.4 Determine source of cooling system service manual<br>6.1.5 Acquire cooling system service manual<br>6.1.6 Interpret cooling system service manual<br>6.1.7 Carefully read and observe precaution warnings given by manual   |
|   |            | 6.2 Remove external attachments                      | 6.2.1 Identify Type of battery terminal<br>6.2.2 Identify Types of electrical cable<br>6.2.3 Define Oil pressure electrical circuit<br>6.2.4 Identify Types of lubrication oil pipes<br>6.2.5 Explain Methods of removing external attachments<br>6.2.6 Disconnect battery terminal<br>6.2.7 Determine types of electrical cable<br>6.2.8 Determine oil pressure electrical circuit<br>6.2.9 Determine types of lubrication oil pipes<br>6.2.10 Disconnect electrical and piping connection<br>6.2.11 Disconnect negative battery terminal first |
|   |            | 6.3 Check oil pressure unit                          | 6.3.1 Explain Function of oil pressure unit<br>6.3.2 Identify Types of oil pressure unit defects<br>6.3.3 Explain Procedures of checking oil pressure unit defect<br>6.3.4 Determine function of oil pressure unit<br>6.3.5 Determine types of oil pressure unit defects<br>6.3.6 Apply procedure of checking oil pressure unit defect<br>6.3.7 Conscientious when measure wear parts  |

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|  |  | 6.4 Install oil pressure unit | <ul style="list-style-type: none"><li>6.4.1 Identify Types of oil pressure unit</li><li>6.4.2 Describe Operation of oil pressure unit</li><li>6.4.3 Explain Methods of installing oil pressure unit to engine</li><li>6.4.4 Determine types of oil pressure unit</li><li>6.4.5 Determine operation of oil pressure unit</li><li>6.4.6 Apply method of reinstalling oil pressure unit to engine</li><li>6.4.7 Never use tools or equipment for any purpose other than that for which they were designed</li></ul> |
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**COMPETENCY 7:** Carry out engine greasing

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 7. Carry out engine greasing    |     | 7.1 Obtain machines service manual           | 7.1.1 Identify Source of machines service manual<br>7.1.2 Explain Procedures of acquiring machines service manual<br>7.1.3 Identify Types of machines service manual<br>7.1.4 Determine source of machines service manual<br>7.1.5 Acquire machines service manual<br>7.1.6 Interpret machines service manual<br>7.1.7 Source of machines service manual<br>7.1.8 Procedures of acquiring machines service manual<br>7.1.9 Types of machines service manual   |
|                                 |     | 7.2 Grease machine parts                     | 7.2.1 Explain Functions of grease nipples<br>7.2.2 Identify Types of grease<br>7.2.3 Identify Types of defective nipple<br>7.2.4 Explain Procedures of greasing<br>7.2.5 Describe Using grease gun to inject grease in grease nipple<br>7.2.6 Determine location of grease nipples<br>7.2.7 Choose types of grease<br>7.2.8 Change of defective nipples<br>7.2.9 Apply greasing procedure<br>7.2.10 Use grease gun to inject grease in grease nipple<br>7.2.11 Careful when lubricants and greases, its may splitting to the eyes |

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|  |  | 7.3 Record service checklist | <p>7.3.1 Identify Types of service checklist</p> <p>7.3.2 State Technique of fill in service checklist</p> <p>7.3.3 Explain Methods of fill in service checklist</p> <p>7.3.4 Recording of service checklist</p> <p>7.3.5 Filing of service checklist</p> <p>7.3.6 Determine types of service checklist</p> <p>7.3.7 Fill in service checklist</p> <p>7.3.8 Apply technique of filling in service checklist</p> <p>7.3.9 Record service checklist</p> <p>7.3.10 File service checklist</p> <p>7.3.11 Meticulous in filling service checklist form</p> <p>7.3.12 Meticulous in filing information</p> |
|--|--|------------------------------|--|

**COMPETENCY : 8** Replace engine oil pump

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 8. Replace engine oil pump         |     | 8.1 Obtain machines service manual           | 8.1.1 Explain Source of machines service manual<br>8.1.2 Explain Procedures of acquiring machines service manual<br>8.1.3 Identify Types of machines service manual<br>8.1.4 Determine source of machines service manual<br>8.1.5 Acquire machines service manual<br>8.1.6 Interpret machines service manual<br>8.1.7 Carefully read and observe precaution warnings given by manual                    |
|                                    |     | 8.2 Drain lubrication oil                    | 8.2.1 Identify Types of lubrication oil<br>8.2.2 State Function of lubrication oil<br>8.2.3 Explain Lubricating system<br>8.2.4 Determine types of lubrication oil<br>8.2.5 Determine function of lubrication oil<br>8.2.6 Determine lubricating system<br>8.2.7 Unplug lubrication oil drain plug<br>8.2.8 Dispose used lubrication oil according to Department of Environmental rules and regulation. |
|                                    |     | 8.3 Remove oil sump                          | 8.3.1 Identify Types of sump gasket<br>8.3.2 Explain Function of oil sump<br>8.3.3 Describe Procedures of removing oil sump<br>8.3.4 Determine types of sump gasket<br>8.3.5 Determine function of oil sump<br>8.3.6 Take out oil sump<br>8.3.7 Adhere to safety and health procedure   |

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|  |  | 8.4 Clean oil pump assembly   | <p>8.4.1 Identify Type of oil pump</p> <p>8.4.2 Explain Function of oil pump</p> <p>8.4.3 Describe Operation of oil pump</p> <p>8.4.4 List Cleaning oil pump assembly method</p> <p>8.4.5 Determine type of oil pump</p> <p>8.4.6 Determine function of oil pump</p> <p>8.4.7 Determine operation of oil pump</p> <p>8.4.8 Apply cleaning oil pump assembly method</p> <p>8.4.9 Never use tools or equipment for any purpose other than that for</p> <p>8.4.10 which they were designed</p> <p>8.4.11 Do not use petrol, paraffin or other solvent to remove oil from skin</p> |
|  |  | 8.5 Install oil pump assembly | <p>8.5.1 Identify Type of oil pump</p> <p>8.5.2 Explain Function of oil pump</p> <p>8.5.3 Describe Operation of oil pump</p> <p>8.5.4 Describe Methods of Installing oil pump assembly</p> <p>8.5.5 Determine types of oil pump</p> <p>8.5.6 Determine function of oil pump</p> <p>8.5.7 Determine operation of oil pump</p> <p>8.5.8 Reassemble oil pump assembly to location</p> <p>8.5.9 Careful when working under lifting equipment</p>   |
|  |  | 8.6 Install oil sump assembly | <p>8.6.1 Identify Types of sump gasket</p> <p>8.6.2 Describe Function of oil sump</p> <p>8.6.3 Explain Procedures of removing oil sump</p> <p>8.6.4 Describe Methods of installing oil sump</p> <p>8.6.5 Place sump gasket</p> <p>8.6.6 Inspect oil sump surface from distortion</p> <p>8.6.7 Fix oil sump to engine block</p> <p>8.6.8 Apply method of installing oil sump</p>  |



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|--|--|------------------------------|--|
|  |  | <p>8.7 Test oil pressure</p> | <p>8.7.1 Explain Engine starting procedure</p> <p>8.7.2 State Leakage inspection procedure</p> <p>8.7.3 Identify Engine working temperature</p> <p>8.7.4 Describe Methods of testing oil pressure</p> <p>8.7.5 Updating log book</p> <p>8.7.6 Apply engine starting procedure</p> <p>8.7.7 Check engine leakage</p> <p>8.7.8 Check oil pressure gauge</p> <p>8.7.9 Apply testing oil pressure method</p> <p>8.7.10 Update log book</p> <p>8.7.11 Meticulous when filling service checklist form</p> <p>8.7.12 Keep work areas clean, uncluttered and free of spills</p> <p>8.7.13 Tidy up working area</p> |
|--|--|------------------------------|--|

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **TRANSMISSION SYSTEM MAINTENANCE**  
**MODULE CODE** : **CAAM 204**  
**LEVEL** : **1**  
**SEMESTER** : **2**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 4 hr/week (P)  
5 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Replace drive shaft assembly
- Service gear box assembly
- Service differential assembly
- Repair clutch system
- Replace steering ball joints
- Service parking brake system
- Service hydraulic lines
- Repair hydraulic cylinders

## MODULE DESCRIPTION

This unit identifies the competence required to replace drive shaft assembly using hand tools set, new drive shaft unit, grease, drive shaft assembly service manual, jack, machine safety stand and maintenance check sheet so that drive shaft assembly service manual obtained, drive shaft removed, new drive shaft installed and check sheet recorded in accordance with manufacturer's specification.

This unit identifies the competence required to service gear box assembly using hand tools set, lifting equipment, gear box assembly service manual, gear box oil, new gear box mounting so that gear box assembly service manual obtained, attached components disconnected, gear box assembly removed, gear box assembly installed, attached components connected and check sheet recorded in accordance with manufacturer's specification

This unit identifies the competence required to service differential assembly using hand tools set, differential assembly service manual, torque wrench, special puller, and maintenance check sheet so that differential assembly service manual obtained, attached components and differential assembly removed, differential assembly and attached components installed and check sheet recorded in accordance with manufacturer's specification.

This unit identifies the competence required to repair clutch system using hand tools set, clutch assembly service manual, new clutch plate, new bearing, measuring equipments, grease and maintenance check sheet so that clutch assembly service manual obtained, gearbox assembly and

clutch assembly removed, clutch components dismantled, clutch components checked, clutch components assembled, clutch assembly and gearbox assembly installed and check sheet recorded in accordance manufacturer's specification.

This unit identifies the competence required to Replace steering ball joint using hand tools set, steering ball joint puller, torque wrench, steering ball joint service manual, new ball joint and log book so that steering ball joint service manual obtained, steering ball joint removed, steering ball joint installed and steering system operation tested in accordance with manufacturer's specification.

This unit identifies the competence required to service parking brake system using hand tools set, grease, parking brake service manual and log book so that parking brake service manual obtained, parking brake cable condition checked, adjust parking brake cable tension, test parking brake performance in accordance with manufacturer's specification

This unit identifies the competence required to service hydraulic lines using hand tools set, hydraulic system service manual, hydraulic oil, sealing tape, wrenches, industrial tissue and log book so that hydraulic system service manual obtained, leakage piping checked and damage pipe replacement works executed in accordance with manufacturer's specification.

This unit identifies the competence required to Repair hydraulic cylinders using hand tools set, hydraulic cylinder service manual, hydraulic oil, dial testing indicator (DTI), wrench, jig, industrial tissue, copper rod and log book so that hydraulic cylinder service manual obtained, hydraulic cylinder assembly removed, hydraulic cylinder components dismantled, hydraulic cylinder components checked, hydraulic cylinder components assembled, hydraulic cylinder assembly installed and hydraulic cylinders performance tested in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 4: TRANSMISSION SYSTEM MAINTENANCE

#### COMPETENCY 1: Replace drive shaft assembly

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition    | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|---|---|
| 1. Replace drive shaft assembly |     | 1.1. Obtain Drive Shaft Assembly Service Manual | 1.1.1. Explain sources of drive shaft assembly service manual<br>1.1.2. Explain Procedures of acquiring drive shaft assembly service manual<br>1.1.3. Identify Drive shaft assembly service manual<br>1.1.4. Determine source of drive shaft assembly service manual<br>1.1.5. Acquire drive shaft assembly service manual<br>1.1.6. Interpret drive shaft assembly service manual<br>1.1.7. Carefully read and observe precaution warnings given by manual   |
|                                 |     | 1.2. Remove Drive Shaft                         | 1.2.1. List types of wheel jack<br>1.2.2. List types of ball join<br>1.2.3. Explain procedure of removing drive shaft<br>1.2.4. Lifting up machine wheel<br>1.2.5. Lift up machine wheel accordance with service manual<br>1.2.6. Uninstall ball join accordance with service manual<br>1.2.7. Uninstall outer shaft accordance with service manual<br>1.2.8. Pull out inner shaft accordance with service manual<br>1.2.9. Never use tools or equipment for any purpose other than that for which they were designed |

|  |  |                          |   |
|--|--|--------------------------|---|
|  |  | 1.3. Install Drive Shaft | <ul style="list-style-type: none"> <li>1.3.1. List types of wheel jack</li> <li>1.3.2. List types of ball joint</li> <li>1.3.3. Explain procedure of removing drive shaft</li> <li>1.3.4. Push in inner shaft accordance with service manual</li> <li>1.3.5. Apply method of reinstall outer shaft accordance with service manual</li> <li>1.3.6. Fix ball joint accordance with service manual</li> <li>1.3.7. Careful when lubricants and greases, its may splitting to the eyes</li> <li>1.3.8. Be alert when release jack from machine</li> </ul> |
|  |  | 1.4. Record Check Sheet  | <ul style="list-style-type: none"> <li>1.4.1. Check sheet format</li> <li>1.4.2. List methods of fill in maintenance check sheet</li> <li>1.4.3. List techniques of recording check sheet</li> <li>1.4.4. Determine check sheet format accordance with service manual</li> <li>1.4.5. Fill in maintenance check sheet accordance with service manual</li> <li>1.4.6. Apply recording check sheet technique accordance with service manual</li> <li>1.4.7. Meticulous when recording maintenance check sheet</li> </ul>                                |

**COMPETENCY 2:** Service gear box assembly

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 2. Service gear box assembly                |            | 2.1. Obtain Gear box Assembly Service Manual         | 2.1.1. Explain source of gear box assembly service manual<br>2.1.2. Explain procedures of acquiring gear box assembly service manual<br>2.1.3. List drive gear box service manual<br>2.1.4. Determine source of gear box assembly service manual<br>2.1.5. Acquire gear box assembly service manual<br>2.1.6. Interpret gear box assembly service manual<br>2.1.7. Carefully read and observe precaution warnings given by manual |
|   |            | 2.2. Disconnect Attached Components                  | 2.2.1. List types of gear box mounting<br>2.2.2. List types of gear box oil<br>2.2.3. State disconnecting external attachment procedure<br>2.2.4. Unscrew gear box mounting bolt accordance with service manual<br>2.2.5. Drain out gear box oil accordance with service manual<br>2.2.6. Release bottom guards accordance with service manual<br>2.2.7. Avoid splash gear box oil to skin, floor and eyes                        |
|   |            | 2.3. Remove Gear box Assembly                        | 2.3.1. List types of lifting equipment<br>2.3.2. List methods of removing gear box unit<br>2.3.3. Moving out gear box unit<br>2.3.4. Fix lifting shackles or support gear box with jack<br>2.3.5. Unscrew gear box bolt accordance with service manual<br>2.3.6. Move out gear box unit accordance with service manual<br>2.3.7. Lift and handle all heavy components using lifting equipment                                     |

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|  |  | 2.4. Install Gear box Assembly   | 2.4.1. State function of lifting equipment<br>2.4.2. State function of gear box shaft<br>2.4.3. Explain techniques of tighten gear box bolt<br>2.4.4. Use lifter to place gear box assembly at location accordance with service manual<br>2.4.5. Slot gear box shaft accordance with service manual<br>2.4.6. Tighten gear box bolt accordance with service manual<br>2.4.7. Patient when working at tight area  |
|  |  | 2.5. Connect Attached Components | 2.5.1. List function of gear box mounting<br>2.5.2. State function of bottom guards<br>2.5.3. List type of gear box oil<br>2.5.4. Tighten gear box mounting bolt accordance with service manual<br>2.5.5. Fix bottom guards accordance with service manual<br>2.5.6. Top up gear box oil accordance with service manual<br>2.5.7. Lift and handle all heavy components using lifting equipment   |
|  |  | 2.6. Record Check Sheet          | 2.6.1. Check sheet format<br>2.6.2. List methods of fill in maintenance check sheet<br>2.6.3. Techniques of recording check sheet<br>2.6.4. Determine check sheet format<br>2.6.5. Fill in maintenance check sheet<br>2.6.6. Apply recording check sheet technique<br>2.6.7. Meticulous when recording maintenance check sheet<br>2.6.8. Meticulous when recording schedule maintenance book<br>2.6.9. Keep work areas clean, uncluttered and free of spills |



**COMPETENCY 3:** Service differential assembly

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 3. Service differential assembly            |            | 3.1. Obtain Differential Assembly Service Manual     | 3.1.1. Explain sources of differential assembly service manual<br>3.1.2. Explain procedures of acquiring differential assembly service manual<br>3.1.3. State differential assembly service manual<br>3.1.4. Determine source of differential assembly service manual<br>3.1.5. Acquire differential assembly service manual<br>3.1.6. Interpret differential assembly service manual<br>3.1.7. Read carefully and observe precaution warnings given by manual   |
|   |            | 3.2. Remove Attached Components                      | 3.2.1. Define disconnecting propeller shaft and differential assembly<br>3.2.2. List types of differential oil<br>3.2.3. List Method of releasing external components with differential assembly<br>3.2.4. Disconnect propeller shaft and differential assembly accordance with service manual<br>3.2.5. Drain out differential oil accordance with service manual<br>3.2.6. Release external components with differential assembly accordance with service manual<br>3.2.7. Avoid splash differential oil to skin, floor and eyes |

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|  |  | 3.3. Remove Differential Assembly  | <p>3.3.1. List types of differential unit</p> <p>3.3.2. Explain pulling out wheel shaft from centre housing technique</p> <p>3.3.3. Explain procedure of removing differential assembly</p> <p>3.3.4. Determine types of differential unit correctly.</p> <p>3.3.5. Pull out wheel shaft from centre housing correctly.</p> <p>3.3.6. Follow procedure of removing differential assembly accordance with service manual.</p> <p>3.3.7. Lift and handle all heavy components using lifting equipment</p>                                    |
|  |  | 3.4. Install Differential Assembly | <p>3.4.1. State function of differential unit</p> <p>3.4.2. Identify pressing in wheel shaft from centre housing technique</p> <p>3.4.3. List procedure of Installing differential assembly</p> <p>3.4.4. Determine function of differential unit correctly.</p> <p>3.4.5. Press in wheel shaft from centre housing correctly.</p> <p>3.4.6. Apply procedure of installing differential assembly accordance with service manual</p> <p>3.4.7. Patient when working at tight area</p>   |
|  |  | 3.5. Install Attached Components   | <p>3.5.1. State connecting propeller shaft and differential assembly</p> <p>3.5.2. Describe function of differential oil</p> <p>3.5.3. Define fixing external components to differential assembly</p> <p>3.5.4. Connect propeller shaft and differential assembly accordance with service manual</p> <p>3.5.5. Fix external components to differential assembly correctly.</p> <p>3.5.6. Top up differential oil accordance with service manual.</p> <p>3.5.7. Careful when topping up differential oil, its may splitting to the eyes</p> |

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|--|--|-------------------------|---|
|  |  | 3.6. Record Check Sheet | <p>3.6.1. Check sheet format</p> <p>3.6.2. List methods of fill in maintenance check sheet</p> <p>3.6.3. Identify techniques of recording check sheet</p> <p>3.6.4. Determine check sheet format accordance with service manual</p> <p>3.6.5. Fill in maintenance check sheet correctly.</p> <p>3.6.6. Apply recording check sheet technique accordance with service manual</p> <p>3.6.7. Meticulous when recording maintenance check sheet</p> <p>3.6.8. Meticulous when recording schedule maintenance book</p> <p>3.6.9. Keep work areas clean, uncluttered and free of spills</p> |
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**COMPETENCY 4:** Repair clutch system

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 4 Repair clutch system                      |            | 4.1 Obtain Clutch Assembly Service Manual            | 4.1.1 Describe source of clutch assembly service manual<br>4.1.2 Identify procedures of acquiring clutch assembly service manual<br>4.1.3 Explain clutch assembly service manual<br>4.1.4 Determine source of clutch assembly accordance with service manual<br>4.1.5 Acquire clutch assembly service manual<br>4.1.6 Interpret clutch assembly service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual   |
|   |            | 4.2 Remove Gearbox Assembly                          | 4.2.1 Types of lifting equipment<br>4.2.2 List methods of removing transmission unit<br>4.2.3 Unscrew transmission bolt<br>4.2.4 Moving out transmission unit<br>4.2.5 Disconnect external attachment correctly.<br>4.2.6 Fix lifting shackles or support transmission with jack<br>4.2.7 Method of unscrew transmission bolt accordance with service manual<br>4.2.8 Move out transmission unit accordance with service manual<br>4.2.9 Lift and handle all heavy components using lifting equipment of adequate capacity |

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|  |  | 4.3 Remove Clutch Assembly      | <p>4.3.1 List types of clutch unit</p> <p>4.3.2 Describe function of clutch unit</p> <p>4.3.3 Explain procedure of removing clutch unit</p> <p>4.3.4 List method of unscrew clutch unit bolts</p> <p>4.3.5 List method of Uninstall clutch assembly</p> <p>4.3.6 Determine types of clutch unit correctly.</p> <p>4.3.7 Determine function of clutch unit correctly.</p> <p>4.3.8 Unscrew clutch unit bolts accordance with service manual</p> <p>4.3.9 Uninstall clutch assembly accordance with service manual</p> <p>4.3.10 Apply removing clutch unit procedure accordance with service manual</p> <p>4.3.11 Meticulous when dealing with heavy components</p> |
|  |  | 4.4 Dismantle Clutch Components | <p>4.4.1 List types of clutch components such as</p> <ul style="list-style-type: none"> <li>• Clutch plate</li> <li>• Pressure plate</li> <li>• Clutch bearing</li> </ul> <p>4.4.2 State function of clutch components</p> <p>4.4.3 Describe procedure of dismantling clutch components</p> <p>4.4.4 Determine types of clutch components correctly.</p> <p>4.4.5 Determine function of clutch components correctly.</p> <p>4.4.6 Apply dismantling clutch components procedure accordance with service manual</p> <p>4.4.7 Meticulous when dismantling clutch components</p>  |

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|--|--|--------------------------------|--|
|  |  | 4.5 Check Clutch Components    | <p>4.5.1 List types of clutch components defect</p> <p>4.5.2 State checking clutch components method</p> <p>4.5.3 List using measuring equipment</p> <p>4.5.4 Determine types of clutch components defect accordance with service manual</p> <p>4.5.5 Inspect clutch components such as</p> <ul style="list-style-type: none"> <li>• Thickness of clutch plate</li> <li>• Wear and tear of pressure plate diaphragm</li> <li>• Roughness of bearing accordance with service manual</li> </ul> <p>4.5.6 Use measuring equipment correctly.</p> <p>4.5.7 Do not use petrol, paraffin or other solvent to remove oil from skin</p> <p>4.5.8 Conscientious when measure wear parts</p> |
|  |  | 4.6 Assemble Clutch Components | <p>4.6.1 List types of clutch components</p> <p>4.6.2 State function of clutch components</p> <p>4.6.3 Describe procedure of assembling clutch components</p> <p>4.6.4 Determine types of clutch components correctly.</p> <p>4.6.5 Determine function of clutch components correctly.</p> <p>4.6.6 Apply assembling clutch components procedure accordance with service manual</p> <p>4.6.7 Meticulous when assembling clutch components</p>  |

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|--|--|------------------------------|--|
|  |  | 4.7 Install Clutch Assembly  | <p>4.7.1 Explain operation of clutch assembly</p> <p>4.7.2 State function ability of clutch unit</p> <p>4.7.3 Describe procedure of installing clutch unit</p> <p>4.7.4 List Reinstall clutch assembly</p> <p>4.7.5 Tighten clutch unit bolts</p> <p>4.7.6 Determine operation of clutch unit correctly.</p> <p>4.7.7 Determine function ability of clutch unit accordance with service manual</p> <p>4.7.8 Reinstall clutch assembly accordance with manufacturer's specification.</p> <p>4.7.9 Tighten clutch unit bolts accordance with manufacturer's specification.</p> <p>4.7.10 Apply procedure of installing clutch unit correctly.</p> <p>4.7.11 Lift and handle all heavy components using lifting equipment</p> |
|  |  | 4.8 Install Gearbox Assembly | <p>4.8.1 State function of lifting equipment</p> <p>4.8.2 State function of transmission shaft</p> <p>4.8.3 Describe procedure of adjusting clutch free-play</p> <p>4.8.4 Define connecting external attachments</p> <p>4.8.5 Use lifter to place transmission assembly at location correctly.</p> <p>4.8.6 Slot transmission shaft</p> <p>4.8.7 Tighten transmission bolt</p> <p>4.8.8 Connect external attachments</p> <p>4.8.9 Adjust clutch free-play</p> <p>4.8.10 Accuracy when setting torque wrench</p>  |

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|--|--|------------------------|---|
|  |  | 4.9 Record Check Sheet | <ul style="list-style-type: none"><li>4.9.1 Check sheet format</li><li>4.9.2 List methods of fill in maintenance check sheet</li><li>4.9.3 Identify techniques of recording check sheet</li><li>4.9.4 Determine check sheet format</li><li>4.9.5 Fill in maintenance check sheet</li><li>4.9.6 Apply technique of recording check sheet</li><li>4.9.7 Meticulous when recording maintenance check sheet</li><li>4.9.8 Meticulous when recording schedule maintenance book</li><li>4.9.9 Keep work areas clean, uncluttered and free of spills</li></ul> |
|--|--|------------------------|---|



**COMPETENCY 5:** Replace steering ball joints

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 5 Replace steering ball joints              |            | 5.1 Obtain Steering Ball Joint Service Manual        | 5.1.1 Sources of steering ball joint service manual<br>5.1.2 Procedures of acquiring steering ball joint service manual<br>5.1.3 Steering ball joint service manual<br>5.1.4 Determine source of steering ball joint service manual<br>5.1.5 Acquire steering ball joint service manual<br>5.1.6 Interpret steering ball joint service manual<br>5.1.7 Carefully read and observe precaution warnings given by manual  |
|   |            | 5.2 Remove Steering Ball Joint                       | 5.2.1 Types of steering ball joint<br>5.2.2 Function of steering ball joint<br>5.2.3 Procedure of removing steering ball joint<br>5.2.4 Using special tool to remove steering ball join from it location<br>5.2.5 Types of steering ball joint defect<br>5.2.6 Determine types of steering ball joint<br>5.2.7 Determine function of steering ball joint<br>5.2.8 Lift up equipment<br>5.2.9 Use special tool to remove steering ball join from it location<br>5.2.10 Apply removing steering ball joint procedure<br>5.2.11 Careful when lifting up equipment |

|  |  |                                    |  |
|--|--|------------------------------------|--|
|  |  | 5.3 Install Steering Ball Joint    | 5.3.1 Function ability of steering ball joint<br>5.3.2 Using torque wrench procedure<br>5.3.3 Apply procedure of installing steering ball joint<br>5.3.4 Tighten steering ball join nut to proper torque<br>5.3.5 Lifting down equipment<br>5.3.6 Determine ability of steering ball joint function<br>5.3.7 Plug steering ball join to location<br>5.3.8 Tighten steering ball join nut to proper torque<br>5.3.9 Apply procedure of installing steering ball joint<br>5.3.10 Lift down equipment<br>5.3.11 Never use tools or equipment for any purpose other than that for which they were designed |
|  |  | 5.4 Test Steering System Operation | 5.4.1 Engine starting procedure (If necessary for power steering system)<br>5.4.2 Steering system inspection procedure.<br>5.4.3 Updating log book<br>5.4.4 Apply procedure of engine starting<br>5.4.5 Turn wheel to left and right to check function ability of steering ball joint and end play<br>5.4.6 Apply steering system inspection procedure<br>5.4.7 Update log book<br>5.4.8 Meticulous when recording log book<br>5.4.9 Keep work areas clean, uncluttered and free of spills<br>5.4.10 Tidy up working area  |

**COMPETENCY 6:** Service parking brake system

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 6 Service parking brake system              |            | 6.1 Obtain Parking Brake Service Manual              | 6.1.1 Sources of parking brake service manual<br>6.1.2 Procedures of acquiring parking brake service manual<br>6.1.3 Parking brake service manual<br>6.1.4 Determine source of parking brake service manual<br>6.1.5 Acquire parking brake service manual<br>6.1.6 Interpret parking brake service manual<br>6.1.7 Carefully read and observe precaution warnings given by manual  |
|   |            | 6.2 Check Parking Brake Cable Condition              | 6.2.1 Function of parking brake system<br>6.2.2 Types of parking brake cable<br>6.2.3 Types of parking brake parts defect<br>6.2.4 Procedure of checking parking brake cable<br>6.2.5 Determine function of parking brake system<br>6.2.6 Determine types of parking brake cable<br>6.2.7 Inspect parking brake linkages from defect<br>6.2.8 Apply checking parking brake cable procedure<br>6.2.9 Carefully read and observe precaution warnings given by manual |
|   |            | 6.3 Adjust Parking Brake Cable Tension               | 6.3.1 Parking brake cable tension<br>6.3.2 Adjusting parking brake cable tension procedure<br>6.3.3 Pulling parking brake lever and count the “click”<br>6.3.4 Determine parking brake cable tension<br>6.3.5 Pull parking brake lever and count the “click”<br>6.3.6 Apply adjusting parking brake cable tension procedure<br>6.3.7 Carefully read and observe precaution warnings given by manual  |

|  |  |                                    |   |
|--|--|------------------------------------|---|
|  |  | 6.4 Test Parking Brake Performance | <ul style="list-style-type: none"><li>6.4.1 Parking brake inspection procedure</li><li>6.4.2 Updating log bookPulling parking brake lever and ensure tire lock</li><li>6.4.3 Apply parking brake inspection procedure</li><li>6.4.4 Pull parking brake lever and ensure tire lock</li><li>6.4.5 Update log book</li><li>6.4.6 Careful when lifting up equipment</li><li>6.4.7 Meticulous when filling service checklist form</li><li>6.4.8 Tidy up working area</li></ul> |
|--|--|------------------------------------|---|

**COMPETENCY 7: Service hydraulic lines**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 7 Service hydraulic lines                   |            | 7.1 Obtain Hydraulic System Service Manual           | 7.1.1 Source of hydraulic system service manual<br>7.1.2 Procedures of acquiring hydraulic system service manual<br>7.1.3 Hydraulic system service manual<br>7.1.4 Determine source of hydraulic system service manual<br>7.1.5 Acquire hydraulic system service manual<br>7.1.6 Interpret hydraulic system service manual<br>7.1.7 Interpret hydraulic system circuit<br>7.1.8 Carefully read and observe precaution warnings given by manual   |
|   |            | 7.2 Check Leakage Piping                             | 7.2.1 Types of hydraulic pipes<br>7.2.2 Hydraulic piping circuit<br>7.2.3 Types of hydraulic oil<br>7.2.4 Checking leakage procedure<br>7.2.5 Operating all hydraulic system<br>7.2.6 Marking leakage area<br>7.2.7 Determine types of hydraulic pipes such as <ul style="list-style-type: none"> <li>• Single point</li> <li>• 3-point linkages</li> </ul> 7.2.8 Interpret hydraulic piping circuit<br>7.2.9 Determine types of hydraulic oil<br>7.2.10 Apply engine starting procedure<br>7.2.11 Operate all hydraulic system<br>7.2.12 Mark leakage area<br>7.2.13 Switch of engine<br>7.2.14 Apply checking leakage procedure<br>7.2.15 Avoid splash hydraulic oil to skin, floor and eyes |

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|  |  | <p>7.3 Execute Damage Pipe Replacement Works</p> | <p>7.3.1 Types of hydraulic pipes damage<br/> 7.3.2 Depressurizing hydraulic system method<br/> 7.3.3 Replacing pipe line procedure<br/> 7.3.4 Change pipe line<br/> 7.3.5 Apply replacing pipe line procedure<br/> 7.3.6 Updating log book<br/> 7.3.7 Determine type of hydraulic pipes damage<br/> 7.3.8 Depressurize hydraulic system<br/> 7.3.9 Disconnect damage pipe line<br/> 7.3.10 Change pipe line<br/> 7.3.11 Apply replacing pipe line procedure<br/> 7.3.12 Update log book<br/> 7.3.13 Meticulous when filling service checklist form<br/> 7.3.14 Keep work areas clean, uncluttered and free of spills<br/> 7.3.15 Tidy up working area</p> |
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**COMPETENCY 8:** Repair hydraulic cylinders

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 8 Repair hydraulic cylinders                |            | 8.1 Obtain Hydraulic Cylinder Service Manual         | 8.1.1 Source of hydraulic cylinder service manual<br>8.1.2 Procedures of acquiring hydraulic cylinder service manual<br>8.1.3 Hydraulic cylinder service manual<br>8.1.4 Determine source of hydraulic cylinder service manual<br>8.1.5 Acquire hydraulic cylinder service manual<br>8.1.6 Interpret hydraulic cylinder service manual<br>8.1.7 Interpret hydraulic cylinder circuit<br>8.1.8 Carefully read and observe precaution warnings given by manual |
|   |            | 8.2 Remove Hydraulic Cylinder Assembly               | 8.2.1 Hydraulic system<br>8.2.2 Types of hydraulic oil<br>8.2.3 Procedure of removing hydraulic cylinder assembly procedure<br>8.2.4 Draining hydraulic oil from the ram<br>8.2.5 Depressurise hydraulic system<br>8.2.6 Disconnect hydraulic linkages<br>8.2.7 Uninstall hydraulic cylinder assembly<br>8.2.8 Drain hydraulic oil from the ram<br>8.2.9 Plug hoses and piping end for safety  |

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|  |  | 8.3 Dismantle Hydraulic Cylinder Components | <p>8.3.1 Hydraulic cylinder components</p> <p>8.3.2 Procedure of dismantling hydraulic cylinder components</p> <p>8.3.3 Disassemble piston seals, rod seal and rod wiper</p> <p>8.3.4 Soaking components with detergent</p> <p>8.3.5 Uninstall front cap</p> <p>8.3.6 Uninstall piston rod from cylinder housing</p> <p>8.3.7 Disassemble piston seals, rod seal and rod wiper</p> <p>8.3.8 Soak components with detergent</p> <p>8.3.9 Meticulous when removing piston rod.</p>  |
|  |  | 8.4 Check Hydraulic Cylinder Components     | <p>8.4.1 Types of hydraulic cylinder components defect</p> <p>8.4.2 Inspecting rod alignment method</p> <p>8.4.3 Inspection of hydraulic cylinder parts and components defect procedure</p> <p>8.4.4 Checking hydraulic cylinder components procedure</p> <p>8.4.5 Changing defect parts and components</p> <p>8.4.6 Determine types of hydraulic cylinder components defect</p> <p>8.4.7 Inspect rod alignment</p> <p>8.4.8 Check hydraulic cylinder parts and components from defect</p> <p>8.4.9 Procedure of checking hydraulic cylinder components</p> <p>8.4.10 Change defect parts and components</p> <p>8.4.11 Meticulous when removing piston rod.</p> |
|  |  | 8.5 Assemble Hydraulic Cylinder Components  | <p>8.5.1 Hydraulic cylinder components</p> <p>8.5.2 Assembling hydraulic cylinder components procedure</p> <p>8.5.3 Reinstalling front cap</p> <p>8.5.4 Procedure of assembling hydraulic cylinder components</p> <p>8.5.5 Reassemble piston seals, rod seal and rod wiper</p> <p>8.5.6 Reinstall piston rod from cylinder housing</p> <p>8.5.7 Reinstall front cap</p> <p>8.5.8 Follow procedure of assembling hydraulic cylinder components</p>   |



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|  |  | 8.6 Install Hydraulic Cylinder Assembly  | 8.6.1 Hydraulic system<br>8.6.2 Types of hydraulic oil<br>8.6.3 Removing cylinder ram assembly procedure<br>8.6.4 Reinstall cylinder ram assembly<br>8.6.5 Connect hydraulic linkages<br>8.6.6 Top up hydraulic oil<br>8.6.7 Ensure unplug hoses and piping before installation works   |
|  |  | 8.7 Test Hydraulic Cylinders Performance | 8.7.1 Engine starting procedure<br>8.7.2 Operating hydraulic system<br>8.7.3 Testing hydraulic performance method<br>8.7.4 Inspecting system from leakage<br>8.7.5 Switching of engine<br>8.7.6 Updating log book<br>8.7.7 Apply engine starting procedure<br>8.7.8 Operate hydraulic cylinder system<br>8.7.9 Apply testing hydraulic performance method<br>8.7.10 Inspect system from leakage<br>8.7.11 Switch of engine<br>8.7.12 Update log book<br>8.7.13 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>8.7.14 Tidy up working area |

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **COMBINE HARVESTER MAINTENANCE**  
**MODULE CODE** : **CAAM 205**  
**LEVEL** : **1**  
**SEMESTER** : **2**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 4 hr/week (P)  
5 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Carry out undercarriage schedule maintenance
- Carry out track tension adjustment
- Carry out removing and installing track assembly
- Replace combine harvester cutting blade
- Repair combine harvester reels & pick-up devices
- Service auger unit
- Service conveyor system
- Service elevator system

## MODULE DESCRIPTION

This unit identifies the competence required to carry out undercarriage schedule maintenance using hand tools set, undercarriage schedule maintenance manual, grease, grease gun, final drive oil and service checklist so that undercarriage schedule maintenance manual obtained, undercarriage servicing works checked, undercarriage servicing works execute and service checklist compiled in accordance with manufacturer's specification

This unit identifies the competence required to. carry out track tension adjustment using hand tools set, grease gun, adjusting track service manual, measuring tape and rags so that adjusting track service manual obtained, adjustor guard cover removed, track tension adjusted and machine track tension tested in accordance with manufacturer's specification

This unit identifies the competence required to service track assembly using hand tools set, special tools, removing and installing track service manual and log books so that removing and installing track service manual obtained, track assembly removed, track assembly installed and track operation tested in accordance with manufacturer's specification

This unit identifies the competence required to replace combined harvester cutting blade using hand tools set, cutting blade service manual, new cutting blade, grease, log book so that combined harvester cutting blade service manual obtained, combined harvester cutting blade removed, combined harvester cutting blade condition checked, combined harvester cutting blade installed, combined harvester cutting performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair combined harvester reels and pick-up devices using hand tools set, combined harvester reel and pick-up service manual, new spare parts, log books so that combined harvester reel and pick-up service manual obtained, combined harvester reel and pick-up components dismantled, combined harvester reel and pick-up components replacement works executed, combined harvester reel and pick-up components assembled and combined harvester combined harvester reel and pick-up operation tested in accordance with manufacturer's specification.

This unit identifies the competence required to service auger unit using hand tools set, auger service manual, grease, lubrication oil and service checklist form so that auger service manual obtained, auger servicing works executed and service checklist recorded in accordance with manufacturer's specification.

This unit identifies the competence required to service conveyor system using hand tools set, conveyor service manual, grease, lubrication oil and service checklist form so that conveyor service manual obtained, conveyor servicing works executed and service checklist recorded in accordance with manufacturer's specification.

This unit identifies the competence required to service elevator system using hand tools set, elevator service manual, grease, lubrication oil and service checklist form so that elevator service manual obtained, elevator servicing works executed and service checklist recorded in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 5: COMBINE HARVESTER MAINTENANCE

#### COMPETENCY 1: Carry out track tension adjustment

| CONTENT STANDARD<br>performance       | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------------|-----|--|--|
| 1. Carry out track tension adjustment |     | 1.1 Obtain Adjusting Track Service Manual    | 1.1.1 Identify source of adjusting track service manual<br>1.1.2 Explain procedure of acquiring adjusting track service manual<br>1.1.3 Adjusting track service manual<br>1.1.4 Determine source of adjusting track service manual<br>1.1.5 Acquire adjusting track service manual<br>1.1.6 Interpret adjusting track service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual   |
|                                       |     | 1.2 Remove Adjustor Guard Cover              | 1.2.1 Acquire Machine preparatory<br>1.2.2 List Types of adjustor guard<br>1.2.3 Define Function of adjustor guard<br>1.2.4 Explain Procedure of removing adjustor guard cover<br>1.2.5 Determine types of adjustor guard<br>1.2.6 Determine function of adjustor guard<br>1.2.7 Place machine at forward direction at least twice of the length of track<br>1.2.8 Move forward idler valve<br>1.2.9 Apply removing adjustor guard cover procedure<br>1.2.10 Do not wear rings, wristwatches, jewels and unbuttoned clothing |

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|--|--|--------------------------------|---|
|  |  | 1.3 Adjust Track Tension       | <p>1.3.1 List Types of track</p> <p>1.3.2 State Types of grease</p> <p>1.3.3 Explain Procedure of adjusting track tension</p> <p>1.3.4 Mark on roller frame</p> <p>1.3.5 Open relief valve and allow idler to move back</p> <p>1.3.6 Grease fill valve until roller frame align with ear edge of bearing support</p> <p>1.3.7 Fix back inspection plate</p> <p>1.3.8 Fix adjustor guard cover</p> <p>1.3.9 Careful when lubricants and greases, its may splitting to the eyes</p>   |
|  |  | 1.4 Test Machine Track Tension | <p>1.4.1 Explain Engine starting procedure</p> <p>1.4.2 Describe Track tension inspection procedure</p> <p>1.4.3 Updating log book</p> <p>1.4.4 Apply engine starting procedure</p> <p>1.4.5 Inspect track tension condition</p> <p>1.4.6 Try track performance</p> <p>1.4.7 Update log book</p> <p>1.4.8 Never run the engine in confined spaces which are not equipped with</p> <p>1.4.9 adequate ventilation for exhaust gas extraction</p> <p>1.4.10 Keep work areas clean, uncluttered and free of spills</p> <p>1.4.11 Tidy up working area</p> |

**COMPETENCY : 2** Carry out removing and installing track assembly

| <b>CONTENT<br/>STANDARD<br/>performance</b>         | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>    | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|---|---|
| 2. Carry out removing and installing track assembly |            | 2.1 Obtain Removing and Installing Track Service Manual | 2.1.1 Identify Source of removing and installing track service manual<br>2.1.2 Define Procedure of acquiring removing and installing track service manual<br>2.1.3 service manual<br>2.1.4 Acquire Removing and installing track service manual<br>2.1.5 Determine source of removing and installing track service manual<br>2.1.6 Acquire removing and installing track service manual<br>2.1.7 Interpret removing and installing track service manual<br>2.1.8 Carefully read and observe precaution warnings given by manual |
|   |            | 2.2 Remove Track Assembly                               | 2.2.1 Identify Type of track<br>2.2.2 Describe Function of track<br>2.2.3 Explain Operation of track assembly<br>2.2.4 Removing track assembly procedure<br>2.2.5 Determine type of track<br>2.2.6 Determine function of track<br>2.2.7 Determine operation of track assembly<br>2.2.8 Uninstall track assembly from machine<br>2.2.9 Uninstall track shoes from track assembly<br>2.2.10 Apply removing track assembly procedure<br>2.2.11 Do not wear rings, wristwatches, jewels and unbuttoned clothing                     |

|  |  |                            |   |
|--|--|----------------------------|---|
|  |  | 2.3 Install Track Assembly | <p>2.3.1 Explain Operation of track assembly</p> <p>2.3.2 Installing track shoes to track assembly method</p> <p>2.3.3 Install track assembly to machine method</p> <p>2.3.4 Apply installing track assembly procedure</p> <p>2.3.5 Determine operation of track assembly</p> <p>2.3.6 Reinstall track shoes to track assembly</p> <p>2.3.7 Reinstall track assembly to machine</p> <p>2.3.8 Apply installing track assembly procedure</p> <p>2.3.9 Lift and handle all heavy components using lifting equipment of adequate capacity</p>   |
|  |  | 2.4 Test Track condition   | <p>2.4.1 Explain Engine starting procedure</p> <p>2.4.2 Define Method of testing track condition</p> <p>2.4.3 Update log book</p> <p>2.4.4 Apply engine starting procedure</p> <p>2.4.5 Apply testing track condition method</p> <p>2.4.6 Inspect track condition</p> <p>2.4.7 Try track operation</p> <p>2.4.8 Update log book</p> <p>2.4.9 Never run the engine in confined spaces which are not equipped with</p> <p>2.4.10 Adequate ventilation for exhaust gas extraction</p> <p>2.4.11 Keep work areas clean, uncluttered and free of spills</p> <p>2.4.12 Tidy up working area</p> |



**COMPETENCY : 3** Replace combine harvester cutting blade

| CONTENT<br>STANDARD<br>performance         | Hrs | LEARNING STANDARD<br>performance , condition              | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|---|---|
| 3. Replace combine harvester cutting blade |     | 3.1 Obtain combine harvester cutting blade service manual | <p>3.1.1 Acquire Source of combined harvester cutting blade service manual</p> <p>3.1.2 Define Procedure of acquiring combined harvester cutting blade service manual</p> <p>3.1.3 Adjusting combined harvester cutting blade manual</p> <p>3.1.4 Determine source of combined harvester cutting blade service manual</p> <p>3.1.5 Acquire adjusting combined harvester cutting blade manual</p> <p>3.1.6 Interpret adjusting combined harvester cutting blade manual</p> <p>3.1.7 Carefully read and observe precaution warnings given by manual</p>   |
|  |     | 3.2 Remove combine harvester cutting blade                | <p>3.2.1 Explain Machine preparatory</p> <p>3.2.2 List Types of combined harvester cutting blade</p> <p>3.2.3 Describe Function of combined harvester cutting blade</p> <p>3.2.4 Define Procedure of removing combined harvester cutting blade</p> <p>3.2.5 Lift up combined harvester cutting blade housing</p> <p>3.2.6 Determine types of combined harvester cutting blade</p> <p>3.2.7 Determine function of combined harvester cutting blade</p> <p>3.2.8 Loosen blade bolts and nuts</p> <p>3.2.9 Apply removing combined harvester cutting blade procedure</p> <p>3.2.10 Do not wear rings, wristwatches, jewels and unbuttoned clothing</p> <p>3.2.11 Never use tools or equipment for any purpose other than that for which they were designed</p> |

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|--|--|---|--|
|  |  | 3.3 Check combine harvester cutting blade condition | <p>3.3.1 List Types of combined harvester cutting blade defects</p> <p>3.3.2 Checking combined harvester cutting blade procedure</p> <p>3.3.3 Determine types of combined harvester cutting blade defects</p> <p>3.3.4 Install combined harvester cutting blade from crack and broken</p> <p>3.3.5 Apply checking combined harvester cutting blade procedure</p> <p>3.3.6 Meticulous when handling corrosive parts</p>   |
|  |  | 3.4 Install combine harvester cutting blade         | <p>3.4.1 Explain Machine preparatory</p> <p>3.4.2 List Types of combined harvester cutting blade</p> <p>3.4.3 Describe Function of combined harvester cutting blade</p> <p>3.4.4 Define Procedure of installing cutting blade</p> <p>3.4.5 Lift up combined harvester cutting blade housing</p> <p>3.4.6 Determine types of combined harvester cutting blade</p> <p>3.4.7 Determine function of combined harvester cutting blade</p> <p>3.4.8 Place new combined harvester cutting blade to position</p> <p>3.4.9 Tighten blade bolts and nuts</p> <p>3.4.10 Apply installing combined harvester cutting blade procedure</p> <p>3.4.11 Adhere to safety and health procedure</p>   |
|  |  | 3.5 Test combine harvester cutting performance      | <p>3.5.1 Demonstrate Engine starting procedure</p> <p>3.5.2 Inspecting combined harvester cutting blade condition</p> <p>3.5.3 Testing combined harvester cutting performance method</p> <p>3.5.4 Explain Method of combined harvester cutting blade performance</p> <p>3.5.5 Updating log book</p> <p>3.5.6 Apply engine starting procedure</p> <p>3.5.7 Inspect combined harvester cutting blade condition</p> <p>3.5.8 Apply testing combined harvester cutting performance method</p> <p>3.5.9 Try combined harvester cutting blade performance</p> <p>3.5.10 Update log book</p> <p>3.5.11 Meticulous when recording maintenance check sheet</p> <p>3.5.12 Keep work areas clean, uncluttered and free of spills</p> <p>3.5.13 Tidy up working area</p> |

**COMPETENCY 4:** Repair combine harvester reels & pick-up devices

| <b>CONTENT<br/>STANDARD<br/>performance</b>         | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>         | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>   |
|---|------------|--|---|
| 4. Repair combine harvester reels & pick-up devices |            | 4.1 Obtain combine harvester reel and pick-up service manual | 4.1.1 Source of combined harvester reel and pick-up service manual<br>4.1.2 Procedure of acquiring combined harvester reel and pick-up service manual<br>4.1.3 Adjusting combined harvester reel and pick-up service manual<br>4.1.4 Determine source of combined harvester reel and pick-up service manual<br>4.1.5 Acquire combined harvester reel and pick-up service manual<br>4.1.6 Interpret adjusting cutting blade service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual           |
|   |            | 4.2 Dismantle combine harvester reel and pick-up components  | 4.2.1 List Types of combined harvester reel and pick-up<br>4.2.2 Describe Functions of combined harvester reel and pick-up<br>4.2.3 Specify Methods of dismantling combined harvester reel and pick-up components<br>4.2.4 Determine types of combined harvester reel and pick-up<br>4.2.5 Determine function of combined harvester reel and pick-up<br>4.2.6 Disassemble combined harvester reel and pick-up components<br>4.2.7 Never use tools or equipment for any purpose other than that for which they were designed |

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|  |  | 4.3 Execute combine harvester components replacement works | <p>4.3.1 List Types of combined harvester reel and pick-up components defect</p> <p>4.3.2 Replacing combined harvester reel and pick-up components defect</p> <p>4.3.3 Changing defect components</p> <p>4.3.4 Determine types of combined harvester reel and pick-up components defect</p> <p>4.3.5 Inspect combined harvester reel and pick-up components from defects</p> <p>4.3.6 Change defect components</p> <p>4.3.7 Meticulous when handling corrosive parts</p>   |
|  |  | 4.4 Assemble combine harvester reel and pick-up components | <p>4.4.1 List Types of combined harvester reel and pick-up</p> <p>4.4.2 Describe Functions of combined harvester reel and pick-up</p> <p>4.4.3 Specify Methods of assembling combined harvester reel and pick-up components</p> <p>4.4.4 Determine types of combined harvester reel and pick-up</p> <p>4.4.5 Determine function of combined harvester reel and pick-up</p> <p>4.4.6 Apply reassembling combined harvester reel and pick-up components</p> <p>4.4.7 Meticulous when assembling combined harvester reel and pick-up components</p> |

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|  |  | <p>4.5 Test combine harvester reel and pick-up operation</p> | <p>4.5.1 Demonstrate Engine starting procedure</p> <p>4.5.2 Specify Method of testing combined harvester reel and pick up operation</p> <p>4.5.3 Inspecting combined harvester reel and pick-up inspection condition</p> <p>4.5.4 Updating log book</p> <p>4.5.5 Apply engine starting procedure</p> <p>4.5.6 Follow testing combined harvester reel and pick up operation method</p> <p>4.5.7 Inspect combined harvester reel and pick-up inspection condition</p> <p>4.5.8 Update log book</p> <p>4.5.9 Meticulous when recording maintenance check sheet</p> <p>4.5.10 Keep work areas clean, uncluttered and free of spills</p> <p>4.5.11 Tidy up working area</p> |
|--|--|--|--|

**COMPETENCY 5:** Service auger unit

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 5. Service auger unit              |     | 5.1 Obtain Auger Service Manual              | 5.1.1 Acquire Source of auger unit service manual<br>5.1.2 Explain Procedure to acquire auger unit service manual<br>5.1.3 Describe Auger unit service manual<br>5.1.4 Determine source of auger unit service manual<br>5.1.5 Acquire auger unit service manual<br>5.1.6 Interpret auger unit service manual<br>5.1.7 Carefully read and observe precaution warnings given by manual  |
|                                    |     | 5.2 Execute Auger Servicing Works            | 5.2.1 List Types of auger unit<br>5.2.2 Define Function of auger unit<br>5.2.3 Identify Location of auger unit<br>5.2.4 Recognize Servicing auger parts such as <ul style="list-style-type: none"> <li>•Table</li> <li>•Spiral</li> <li>•Retractable fingers</li> </ul> 5.2.5 Determine types of auger unit<br>5.2.6 Determine function of auger unit<br>5.2.7 Determine location of auger unit<br>5.2.8 Lubricate auger moving parts<br>5.2.9 Clean auger parts<br>5.2.10 Careful when lubricants and greases, its may splitting to the eyes |

|  |  |                              |  |
|--|--|------------------------------|--|
|  |  | 5.3 Record Service checklist | <p>5.3.1 Acquire Service checklist format</p> <p>5.3.2 Describe Technique to fill in service checklist</p> <p>5.3.3 Determine service checklist format</p> <p>5.3.4 Fill in service checklist</p> <p>5.3.5 Apply technique to fill in service checklist</p> <p>5.3.6 Meticulous in fill in checklist</p> |
|--|--|------------------------------|--|

# **COMPETENCY 6: Service conveyor system**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 6. Service conveyor system                  |            | 6.1 Obtain conveyor service manual                   | 6.1.1 Acquire Source of conveyor service manual<br>6.1.2 Explain Procedure to acquire conveyor service manual<br>6.1.3 Describe Conveyor service manual<br>6.1.4 Determine source of conveyor service manual<br>6.1.5 Acquire conveyor service manual<br>6.1.6 Interpret conveyor service manual<br>6.1.7 Carefully read and observe precaution warnings given by manual   |
|   |            | 6.2 Execute conveyor servicing works                 | 6.2.1 List Types of conveyor system<br>6.2.2 Define Function of conveyor system<br>6.2.3 Identify Location of conveyor system<br>6.2.4 Recognize Servicing conveyor system parts such as <ul style="list-style-type: none"> <li>• Table</li> <li>• Paddles</li> <li>• Conveyor chain</li> <li>• Feeder beater (drum)</li> </ul> 6.2.5 Describe Types of conveyor components defects<br>6.2.6 Determine types of conveyor system unit<br>6.2.7 Determine function of conveyor system unit<br>6.2.8 Determine location of conveyor system unit<br>6.2.9 Careful when lubricants and greases, its may splitting to the eyes |



|  |  |                              |   |
|--|--|------------------------------|---|
|  |  | 6.3 Record service checklist | <p>6.3.1 Acquire Service checklist format</p> <p>6.3.2 Describe Technique to fill in service checklist</p> <p>6.3.3 Determine service checklist format</p> <p>6.3.4 Fill in service checklist</p> <p>6.3.5 Apply technique to fill in service checklist</p> <p>6.3.6 Meticulous when recording maintenance check sheet</p> <p>6.3.7 Keep work areas clean, uncluttered and free of spills</p> |
|--|--|------------------------------|---|

# **COMPETENCY 7: Service elevator system**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 7. Service elevator system                  |            | 7.1 Obtain elevator service manual                   | 7.1.1 Determine source of elevator service manual<br>7.1.2 Acquire elevator service manual<br>7.1.3 Interpret elevator service manual  |
|   |            | 7.2 Execute elevator servicing works                 | 7.2.1 Determine types of elevator system unit<br>7.2.2 Determine function of elevator system unit<br>7.2.3 Determine location of elevator system unit<br>7.2.4 Lubricate elevator system moving parts<br>7.2.5 Inspect elevator components from defect |
|   |            | 7.3 Record service checklist                         | 7.3.1 Determine service checklist format<br>7.3.2 Fill in service checklist<br>7.3.3 Apply technique to fill in service checklist  |

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE : FARMING EQUIPMENT MAINTENANCE**

**MODULE CODE : CAAM 206**

**LEVEL : 1**

**SEMESTER : 2**

**CREDIT UNIT : 2.0**

**CONTACT HOUR : 1 hr/week (T) 3 hr/week (P)**  
**4 hr/week (Total)**

**MODULE STATUS : VOCATIONAL**

**PREREQUISITE : -**

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- repair agricultural water pump
- carry out power transmitting chain tension adjustment
- replace power transmitting belt & pulley
- replace stub-axle
- service roller compacter
- service earth spike

## MODULE DESCRIPTION

This unit identifies the competence required to repair agricultural water pump using hand tools set, water pump service manual, pump new spare parts, measuring equipment and log books so that water pump service manual obtained, water pump components dismantled, water pump components replacement works execute, water pump components assembled and agricultural water pump operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to carry out power transmitting chain tension adjustment using hand tools set, power transmitting service manual, grease, straight edge, measuring tape and service checklist form so that power transmitting service manual obtained, chain tension adjusted and service checklist recorded in accordance with manufacturer's specification.

This unit identifies the competence required to replace power transmitting belt & pulley using hand tools set, power transmitting service manual, straight edge, measuring tape, new belt and log book so that power transmitting service manual obtained, power transmitting pulley assembly removed, new power transmitting belt installed and power transmitting belt operation tested in accordance with manufacturer's specification.

This unit identifies the competence required to replace stub-axle using hand tools set, stub- axle service manual, grease, new stub-axle, new seal, new bearing and log book so that stub- axle service manual obtained, stub-axle assembly removed, stub-axle assembly installed and stub-axle operations tested in accordance with manufacturer's specification

This unit identifies the competence required to service roller compacter using hand tools set, roller compacter service manual, new roller compacter components, grease and log book so that roller compacter manual obtained, roller compacter components removed, roller compacter servicing executed and roller compacter components installed and roller compacter condition tested in accordance with manufacturer's specification.

This unit identifies the competence required to service earth spike using hand tools set, reel and pick up service manual, new spare parts and log book so that earth spike service manual obtained, earth spike removed, earth spike components dismantled, control valves components defect checked, control valves components assembled, earth spike installed, hydraulic pump performance tested in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 6: FARMING EQUIPMENT MAINTENANCE

#### COMPETENCY 1: Repair agricultural water pump

| CONTENT STANDARD<br>Performance  | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|----------------------------------|-----|--|--|
| 1 Repair agricultural water pump |     | 1.1 Obtain water pump service manual         | 1.1.1 Acquire Source of water pump service manual<br>1.1.2 Describe Procedure of acquiring water pump service manual<br>1.1.3 Explain Water pump service manual<br>1.1.4 Determine source of cutting blade service manual<br>1.1.5 Acquire adjusting cutting blade manual<br>1.1.6 Interpret adjusting cutting blade manual<br>1.1.7 Carefully read and observe precaution warnings given by manual  |
|                                  |     | 1.2 Dismantle water pump components          | 1.2.1 Identify Types of water pump such as <ul style="list-style-type: none"> <li>Centrifugal pump</li> <li>Variable stroke reciprocating pump</li> <li>Jet pump</li> <li>Rotary pump</li> </ul> 1.2.2 Explain Operation of water pump<br>1.2.3 Describe Method of dismantling water pump procedure<br>1.2.4 Determine types of water pump<br>1.2.5 Determine operation of water pump<br>1.2.6 Determine types of pump connection<br>1.2.7 Use non-flammable non-toxic proprietary solvents as cleaning agents |

|  |  |   |  |
|--|--|---|--|
|  |  | 1.3 Execute water pump components replacement works | <p>1.3.1 Identify Types of pump component defects</p> <p>1.3.2 Demonstrate Replacing water pump components defect procedure</p> <p>1.3.3 Determine types of pump component defects</p> <p>1.3.4 Inspect pump component from defect</p> <p>1.3.5 Measure parts from wear and teat</p> <p>1.3.6 Change defective components</p> <p>1.3.7 Apply replacing water pump components defect procedure</p> <p>1.3.8 Careful when handling corrosive parts</p>   |
|  |  | 1.4 Assemble water pump components                  | <p>1.4.1 Describe Function of water pump</p> <p>1.4.2 Demonstrate Procedure of assembling water pump</p> <p>1.4.3 Determine function of water pump</p> <p>1.4.4 Reassemble pump parts and components</p> <p>1.4.5 Reinstall pump cover</p> <p>1.4.6 Careful when placing gasket</p>  |
|  |  | 1.5 Test agricultural water pump operations         | <p>1.5.1 Demonstrate Pumping procedure</p> <p>1.5.2 Describe Method of testing agricultural water pump operation</p> <p>1.5.3 Updating log book</p> <p>1.5.4 Apply pumping procedure</p> <p>1.5.5 Apply testing agricultural water pump operation method</p> <p>1.5.6 Confirm water pump in function ability</p> <p>1.5.7 Update log book</p> <p>1.5.8 Meticulous when recording maintenance check sheet</p> <p>1.5.9 Keep work areas clean, uncluttered and free of spills</p> <p>1.5.10 Tidy up working area</p> |

**COMPETENCY 2:** Carry out power transmitting chain tension adjustment

| CONTENT STANDARD<br>performance                          | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|--|---|
| 2. Carry out power transmitting chain tension adjustment |     | 2.1 Obtain power transmitting service manual | 2.1.1 Identify Source of power transmitting service manual<br>2.1.2 Explain Procedure to acquire power transmitting service manual<br>2.1.3 Describe Power transmitting service manual<br>2.1.4 Determine source of power transmitting service manual<br>2.1.5 Acquire power transmitting service manual<br>2.1.6 Interpret power transmitting service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual                                       |
|  |     | 2.2 Adjust chain tension                     | 2.2.1 List Types of power transmitting chain<br>2.2.2 Explain Function of power transmitting chain<br>2.2.3 Identify Location of power transmitting chain<br>2.2.4 Define Chain tension adjustment works<br>2.2.5 Determine types of power transmitting chain<br>2.2.6 Determine function of power transmitting chain<br>2.2.7 Determine location of power transmitting chain<br>2.2.8 Apply chain tension adjustment procedure<br>2.2.9 Patient when working at tight area |
|  |     | 2.3 Record service checklist                 | 2.3.1 Acquire Service checklist format<br>2.3.2 Define Technique to fill in service checklist<br>2.3.3 Determine service checklist format<br>2.3.4 Fill in service checklist<br>2.3.5 Apply technique to fill in service checklist<br>2.3.6 Meticulous in fill in checklist   |



**COMPETENCY 3:** Replace power transmitting belt & pulley

| CONTENT STANDARD<br>performance             | Hrs | LEARNING STANDARD<br>performance , condition  | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---|-----|---|---|
| 3. Replace power transmitting belt & pulley |     | 3.1 Obtain power transmitting service manual  | 3.1.1 Identify Source of power transmitting service manual<br>3.1.2 Describe Procedure to acquire power transmitting service manual<br>3.1.3 Explain Power transmitting service manual<br>3.1.4 Determine source of power transmitting service manual<br>3.1.5 Acquire power transmitting service manual<br>3.1.6 Interpret power transmitting service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|   |     | 3.2 Remove power transmitting pulley assembly | 3.2.1 List Types of power transmitting system<br>3.2.2 Explain Function of power transmitting system<br>3.2.3 Identify Location of power transmitting system<br>3.2.4 List Types power transmitting belt<br>3.2.5 Describe Removing power transmitting pulley procedure<br>3.2.6 Recognize Type of power transmitting pulley assembly defect<br>3.2.7 Determine types of power transmitting system<br>3.2.8 Determine function of power transmitting system<br>3.2.9 Determine location of power transmitting system<br>3.2.10 Disconnect power transmitting belt<br>3.2.11 Uninstall power transmitting pulley<br>3.2.12 Inspect power transmitting pulley from defect<br>3.2.13 Never use tools or equipment for any purpose other than that for which they were designed |

#### COMPETENCY 4: Replace stub axle

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 4. Replace stub axle               |     | 4.1 Obtain stub- axle service manual         | 4.1.1 Identify Source of stub-axle service manual<br>4.1.2 Describe Procedure to acquire stub-axle service manual<br>4.1.3 Explain Stub-axle service manual<br>4.1.4 Determine source of stub-axle service manual<br>4.1.5 Acquire stub-axle service manual<br>4.1.6 Interpret stub-axle service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual   |
|                                    |     | 4.2 Remove stub-axle assembly                | 4.2.1 List Types of stub-axle<br>4.2.2 Explain Function of stub-axle<br>4.2.3 Identify Location of stub-axle<br>4.2.4 Describe Removing stub-axle procedure<br>4.2.5 State Types of stub-axle defect<br>4.2.6 Determine types of stub-axle<br>4.2.7 Determine function of stub-axle<br>4.2.8 Determine location of stub-axle<br>4.2.9 Uninstall stub-axle procedure<br>4.2.10 Inspect stub-axle, seal and bearing from defect<br>4.2.11 Do not wear rings, wristwatches, jewels and unbuttoned clothing |

|  |  |                                |   |
|--|--|--------------------------------|---|
|  |  | 4.3 Install stub-axle assembly | <p>4.3.1 Explain Function of stub-axle</p> <p>4.3.2 Describe Installing new stub-axle procedure</p> <p>4.3.3 Identify Types of seal and bearing</p> <p>4.3.4 Determine function of stub-axle</p> <p>4.3.5 Apply installing new stub-axle procedure</p> <p>4.3.6 Change new seal and bearing</p> <p>4.3.7 Confirm installation of new stub-axle</p> <p>4.3.8 Never use tools or equipment for any purpose other than that for which they were designed</p> |
|  |  | 4.4 Test stub-axle operations  | <p>4.4.1 Describe Operation of stub-axle</p> <p>4.4.2 State Testing stub-axle operation method</p> <p>4.4.3 Determine operation of stub-axle</p> <p>4.4.4 Apply testing stub-axle operation method</p> <p>4.4.5 Tidy up working area</p> <p>4.4.6 Update log book</p> <p>4.4.7 Meticulous in fill in checklist</p>  |

**COMPETENCY : 5** Service roller compacter

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 5. Service roller compacter                 |            | 5.1 Obtain roller compacter manual                   | 5.1.1 Acquire Sources of roller compacter manual<br>5.1.2 Identify Procedures of acquiring roller compacter manual<br>5.1.3 Describe Types of roller compacter manual<br>5.1.4 Determine source of roller compacter manual<br>5.1.5 Acquire roller compacter manual<br>5.1.6 Interpret roller compacter manual<br>5.1.7 Carefully read and observe precaution warnings given by manual   |
|   |            | 5.2 Remove roller compacter components               | 5.2.1 Identify Types of roller compacter components<br>5.2.2 Recognize Function of roller compacter components<br>5.2.3 Describe Procedures of removing roller compacter components<br>5.2.4 Determine types of roller compacter components<br>5.2.5 Determine function of roller compacter components<br>5.2.6 Apply procedures of removing roller compacter components<br>5.2.7 Do not wear rings, wristwatches, jewels and unbuttoned clothing.<br>5.2.8 Use proper PPE |

|  |  |   |   |
|--|--|---|---|
|  |  | 5.3 Execute roller compacter servicing  | 5.3.1 Recognize Checking component to be serviced<br>5.3.2 Define Checking roller compacter component condition<br>5.3.3 Identify Greasing oil component parts method<br>5.3.4 Describe Replacing worn out parts technique<br>5.3.5 Explain Technique of handling servicing tools<br>5.3.6 Describe Procedure of roller compacter servicing<br>5.3.7 Inspect component to be serviced<br>5.3.8 Inspect roller compacter component condition<br>5.3.9 Grease oil component parts<br>5.3.10 Change worn out parts<br>5.3.11 Apply technique of handling servicing tools<br>5.3.12 Follow procedure of roller compacter servicing<br>5.3.13 Meticulous when servicing roller compacter |
|  |  | 5.4 Install roller compacter components | 5.4.1 Recognize Functions of roller compacter<br>5.4.2 Describe Procedures of installing roller compacter assembly<br>5.4.3 Define Methods of placing roller compacter to location<br>5.4.4 Support roller compacter assembly with hydraulic jack<br>5.4.5 Apply installing roller compacter assembly procedure<br>5.4.6 Apply method of placing roller compacter to location<br>5.4.7 Meticulous when fixing engine to gearbox assembly  |
|  |  | 5.5 Test roller compacter condition     | 5.5.1 Explain Starting engine procedure<br>5.5.2 Identify Testing roller compacter condition method<br>5.5.3 Apply starting engine procedure<br>5.5.4 Apply testing roller compacter condition method<br>5.5.5 Inspect roller compacter function ability<br>5.5.6 Tidy up working area<br>5.5.7 Update log book<br>5.5.8 Keep work areas clean, uncluttered and free of spills<br>5.5.9 Tidy up working area  |

# **COMPETENCY 6: Service earth spike**

| <b>CONTENT<br/>STANDARD<br/>performance</b> | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b> | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 6. Service earth spike                      |            | 6.1 Obtain earth spike service manual                | 6.1.1 Acquire Source of earth spike service manual<br>6.1.2 Describe Procedures of acquiring earth spike service manual<br>6.1.3 Explain Earth spike service manual<br>6.1.4 Determine source of earth spike service manual<br>6.1.5 Acquire earth spike service manual<br>6.1.6 Interpret earth spike service manual<br>6.1.7 Interpret earth spike circuit<br>6.1.8 Carefully read and observe precaution warnings given by manual |
|   |            | 6.2 Remove earth spike                               | 6.2.1 Describe Types of hydraulic valves<br>6.2.2 Identify Earth spike<br>6.2.3 Recognize Types of hydraulic oil<br>6.2.4 Explain Procedure of removing earth spike<br>6.2.5 Determine types of earth spike<br>6.2.6 Depressurize hydraulic system<br>6.2.7 Disconnect hydraulic linkages<br>6.2.8 Uninstall earth spike<br>6.2.9 Plug hoses and piping end for safety   |
|   |            | 6.3 Dismantle earth spike components                 | 6.3.1 Recognize Type of hand tools<br>6.3.2 Explain Procedure of dismantling earth spike parts and components<br>6.3.3 Choose type of hand tools<br>6.3.4 Disassemble hydraulic control valve components in sequence<br>6.3.5 Meticulous when removing internal parts of control Valves  |

|  |  |  |   |
|--|--|--|---|
|  |  | 6.4 Check control valves components    | <p>6.4.1 Recognize Types of earth spike components defect</p> <p>6.4.2 Describe Procedure of Inspection of control valves from defect</p> <p>6.4.3 Measuring worn out parts technique</p> <p>6.4.4 Explain Changing defect parts</p> <p>6.4.5 Determine types of earth spike components defect</p> <p>6.4.6 Inspect control valves components defects</p> <p>6.4.7 Measure worn out parts</p> <p>6.4.8 Change defect parts</p> <p>6.4.9 Meticulous when removing internal parts of control valves</p> |
|  |  | 6.5 Assemble control valves components | <p>6.5.1 Identify Procedure of assembling control valves parts and components</p> <p>6.5.2 Describe Inserting control valves inner parts technique</p> <p>6.5.3 Follow procedure of reassembling control valves parts and components</p> <p>6.5.4 Insert control valves inner parts</p> <p>6.5.5 Meticulous when removing internal parts of control valves</p>  |
|  |  | 6.6 Install earth spike                | <p>6.6.1 Identify Types of earth spike</p> <p>6.6.2 Explain Function of earth spike</p> <p>6.6.3 Describe Method of reinstalling earth spike assembly</p> <p>6.6.4 Determine types of earth spike</p> <p>6.6.5 Apply method reinstall earth spike assembly</p> <p>6.6.6 Fix hydraulic linkages</p> <p>6.6.7 Meticulous when removing internal parts of control valves</p>   |

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|  |  | <p>6.7 Test hydraulic pump performance</p> | <p>6.7.1 State Engine starting procedure</p> <p>6.7.2 Identify Operating hydraulic system</p> <p>6.7.3 Explain Procedure of testing hydraulic performance</p> <p>6.7.4 Apply engine starting procedure and set to manufacturer recommended load</p> <p>6.7.5 Recognize Hydraulic flow in different situation such as</p> <ul style="list-style-type: none"> <li>• Zero pressure</li> <li>• 250 p.s.i</li> </ul> <p>6.7.6 Identify Checking system from leakage</p> <p>6.7.7 Apply Switching of engine</p> <p>6.7.8 Updating log book</p> <p>6.7.9 Setup flow meter at outlet port of reservoir</p> <p>6.7.10 Operate earth spike system or implement function</p> <p>6.7.11 Open hydraulic tester load valve</p> <p>6.7.12 Apply procedure of engine starting and set to manufacturer recommended load</p> <p>6.7.13 Determine hydraulic flow in different situation</p> <p>6.7.14 Check system from leakage</p> <p>6.7.15 Switch of engine</p> <p>6.7.16 Update log book</p> <p>6.7.17 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>6.7.18 Meticulous when filling service checklist form</p> <p>6.7.19 Keep work areas clean, uncluttered and free of spills</p> <p>6.7.20 Tidy up working area</p> <p>6.7.21 Keep work areas clean, uncluttered and free of spills</p> <p>6.7.22 Tidy up working area</p> |
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**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **HYDRAULIC SYSTEM REPAIR**  
**MODULE CODE** : **CAAM 307**  
**LEVEL** : **2**  
**SEMESTER** : **3**  
**CREDIT UNIT** : 4.0  
**CONTACT HOUR** : 1 hr/week (T) 6 hr/week (P)  
7 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Overhaul manual steering box
- Overhaul power steering assembly
- Repair disc brake assembly
- Repair multiple disc brake assembly
- Repair brake master cylinder
- Repair hydraulic pump
- Service hydraulic control valves

## MODULE DESCRIPTION

This unit identifies the competence required to overhaul manual steering box using hand tools set, manual steering box service manual, special tools, steering oil, solvent and log book so that manual steering box service manual obtained, steering box assembly removed, steering box component dismantled, component defect checked, steering box component assembled, steering box assembly installed and steering box operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to overhaul power steering assembly using hand tools set, power steering system service manual, pressure gauge, steering oil, solvents, new parts and log books so that power steering system service manual obtained, power steering assembly removed, power steering component dismantled, power steering component checked, power steering component assembled, power steering installed and power steering performance tested in accordance with manufacturer's specification

This unit identifies the competence required to repair disc brake assembly using hand tools set, disc brake service manual, anti rush, maintenance check sheet, floor jack, brake fluid, air compressor and new oil seal so that disc brake service manual obtained, tractor wheel removed, disc brake components dismantled, disc brake components checked, disc brake components assembled, tractor wheel installed and brake performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair multiple disc brake assembly using hand tools set, multiple disc brake service manual, anti rush, maintenance check sheet, floor jack, brake fluid, air compressor and new oil seal so that multiple disc brake service manual obtained, machine wheel removed, multiple disc brake components dismantled, multiple disc brake components checked, multiple disc brake components assembled, machine wheel installed and brake performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair brake master cylinder using hand tools set, brake master cylinder service manual, sand paper, brake fluid, plastic hose, new rubber seal, and log book so that brake master cylinder service manual obtained, brake master cylinder assembly removed, brake master cylinder component dismantled, brake master cylinder component checked, brake master cylinder component assembled, brake master cylinder assembly installed and brake master cylinder performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair hydraulic pump using hand tools set, hydraulic oil, hydraulic pump service manual, bearing extractor, measuring equipment, new parts and log book so that hydraulic pump service manual obtained, hydraulic pump removed, pump components dismantled, pump components checked, pump components assembled, hydraulic pump installed and hydraulic system performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to service hydraulic control valves using hand tools set, hydraulic oil, hydraulic control valves service manual, bearing extractor, feeler gauge, industrial tissue, flow meter, new parts and log book so that hydraulic control valves service manual obtained, hydraulic control valves removed, hydraulic control valves components dismantled, control valves components checked, control valves components assembled, hydraulic control valves installed, hydraulic pump performance tested in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

**Programme : AGRICULTURAL MECHANIZATION**

**Module 8: HYDRAULIC SYSTEM REPAIR**

**COMPETENCY 1: Overhaul manual steering box**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition   | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 1. Overhaul manual steering box    |     | 1.1. Obtain Manual Steering Box Service Manual | 1.1.1 Sources of manual steering box service manual<br>1.1.2 Procedures of acquiring manual steering box service manual<br>1.1.3 Manual steering box service manual<br>1.1.4 Determine source of manual steering box service manual<br>1.1.5 Acquire manual steering box service manual<br>1.1.6 Interpret manual steering box service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual |

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|  |  | 1.2. Remove Steering Box Assembly     | 1.2.1 Types of steering box<br>1.2.2 Function of manual steering box<br>1.2.3 Operation of manual steering box<br>1.2.4 Removing steering box assembly<br>1.2.5 Disconnecting external attachment<br>1.2.6 Uninstalling steering arm connection<br>1.2.7 Determine types of steering box<br>1.2.8 Determine function of manual steering box<br>1.2.9 Determine operation of manual steering box<br>1.2.10 Disconnect external attachment<br>1.2.11 Uninstall steering arm connection<br>1.2.12 Apply removing steering box assembly procedure<br>1.2.13 Do not wear rings, wristwatches, jewels and unbuttoned clothing |
|  |  | 1.3. Dismantle Steering Box Component | 1.3.1 Determine function of steering box components<br>1.3.2 Procedure of dismantling steering box components<br>1.3.3 Steering box components<br>1.3.4 Determine function of steering box components<br>1.3.5 Apply dismantling steering box components procedure<br>1.3.6 Disassemble steering box components<br>1.3.7 Patient when working at tight area   |
|  |  | 1.4. Check Component Defect           | 1.4.1 Types of steering box components defect<br>1.4.2 Types of measuring tools<br>1.4.3 Checking steering box components defect procedure<br>1.4.4 Checking steering box components from defect<br>1.4.5 Conscientious when measure wear parts<br>1.4.6 Determine types of steering box components defect<br>1.4.7 Choose types of measuring equipments<br>1.4.8 Inspect steering box components from defect<br>1.4.9 Apply checking steering box components defect procedure<br>1.4.10 Never use gasoline, diesel oil or other flammable liquids as cleaning agents   |

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|  |  | 1.5. Assemble Steering Box Component | 1.5.1 Function of steering box components<br>1.5.2 Procedure of assembling steering box components<br>1.5.3 Meticulous when assembling steering box components<br>1.5.4 Determine function of steering box components<br>1.5.5 Apply procedure of assembling steering box components  |
|  |  | 1.6. Install Steering Box Assembly   | 1.6.1 Types of steering box<br>1.6.2 Function of manual steering box<br>1.6.3 Operation of manual steering box<br>1.6.4 Reinstalling steering arm connection<br>1.6.5 Connecting external attachment<br>1.6.6 Procedure of installing steering box assembly<br>1.6.7 Determine types of steering box<br>1.6.8 Determine function of manual steering box<br>1.6.9 Determine operation of manual steering box<br>1.6.10 Reinstall steering arm connection<br>1.6.11 Connect external attachment<br>1.6.12 Apply installing steering box assembly procedure<br>1.6.13 Meticulous when installing steering box assembly |
|  |  | 1.7. Test Steering Box Operations    | 1.7.1 Steering box inspection procedure<br>1.7.2 Steering system performance<br>1.7.3 Updating log book<br>1.7.4 Inspect steering box system such as <ul style="list-style-type: none"> <li>• Abnormal sound</li> <li>• Leakage</li> <li>• Smooth running</li> </ul> 1.7.5 Apply steering box inspection procedure<br>1.7.6 Update log book<br>1.7.7 Keep work areas clean, uncluttered and free of spills<br>1.7.8 Meticulous when recording maintenance check sheet<br>1.7.9 Tidy up working area   |

**COMPETENCY 2:** Overhaul power steering assembly

| CONTENT<br>STANDARD<br>performance  | Hrs | LEARNING STANDARD<br>performance , condition     | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|-------------------------------------|-----|--|---|
| 2. Overhaul power steering assembly |     | 2.1. Obtain Power Steering System Service Manual | 2.1.1 Source of power steering system service manual<br>2.1.2 Procedures of acquiring power steering system service manual<br>2.1.3 Power steering system service manual<br>2.1.4 Determine source power steering system service manual<br>2.1.5 Acquire power steering system service manual<br>2.1.6 Interpret power steering system service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual   |
|                                     |     | 2.2. Remove Power Steering Assembly              | 2.2.1 Types of steering oil<br>2.2.2 Types of power steering hoses<br>2.2.3 Types of power steering pump<br>2.2.4 Function of steering control valve<br>2.2.5 Detaching steering cylinder procedure<br>2.2.6 Drain steering oil<br>2.2.7 Disconnect hoses and external attachment from steering system<br>2.2.8 Disconnect steering pump<br>2.2.9 Dismount steering control valve<br>2.2.10 Detach steering cylinder from machine<br>2.2.11 Do not wear rings, wristwatches, jewels and unbuttoned clothing |

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|  |  | 2.3. Dismantle Power Steering Component | <p>2.3.1 Function of power steering components</p> <p>2.3.2 Procedure of dismantling power steering components</p> <p>2.3.3 Types of solvent</p> <p>2.3.4 Disassemble power steering components such as</p> <ul style="list-style-type: none"> <li>Steering pump assembly</li> <li>Steering control and relief valve assembly</li> <li>Steering cylinder assembly</li> </ul> <p>2.3.5 Apply dismantling power steering components procedure</p> <p>2.3.6 Soak parts and component with solvent</p> <p>2.3.7 Patient when working at tight area</p>  |
|  |  | 2.4. Check Power Steering Component     | <p>2.4.1 Types of power steering component defect</p> <p>2.4.2 Checking power steering components procedure</p> <p>2.4.3 Conscientious when measure wear parts</p> <p>2.4.4 Determine types of power steering component defect</p> <p>2.4.5 Apply checking power steering components procedure</p> <p>2.4.6 Replace power steering defective parts</p> <p>2.4.7 Never use gasoline, diesel oil or other flammable liquids as cleaning agents</p>  |
|  |  | 2.5. Assemble Power Steering Component  | <p>2.5.1 Function ability of power steering components</p> <p>2.5.2 Procedure of assembling power steering components</p> <p>2.5.3 Confirming function ability of the components</p> <p>2.5.4 Reassemble power steering components such as</p> <ul style="list-style-type: none"> <li>Steering pump assembly</li> <li>Steering control and relief valve assembly</li> <li>Steering cylinder assembly</li> </ul> <p>2.5.5 Apply assembling power steering components procedure</p> <p>2.5.6 Confirm function ability of the components</p> <p>2.5.7 Meticulous when assembling power steering components</p> |



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|  |  | 2.6. Install Power Steering          | 2.6.1 Attaching steering cylinder to machine method<br>2.6.2 Function of steering control valve<br>2.6.3 Function of steering pump<br>2.6.4 Types steering oil<br>2.6.5 Topping up steering oil<br>2.6.6 Attach steering cylinder to machine<br>2.6.7 Mount steering control valve<br>2.6.8 Connect steering pump<br>2.6.9 Connect hoses and external attachment to steering system<br>2.6.10 Top up steering oil<br>2.6.11 Meticulous when installing power steering assembly   |
|  |  | 2.7. Test Power Steering Performance | 2.7.1 Engine starting procedure<br>2.7.2 Leakage inspect procedure<br>2.7.3 Power steering testing procedure<br>2.7.4 Power steering testing procedure<br>2.7.5 Updating log book<br>2.7.6 Apply engine starting procedure<br>2.7.7 Inspect power steering system leakage<br>2.7.8 Move steering to left and right<br>2.7.9 Justify steering performance<br>2.7.10 Apply power steering testing procedure<br>2.7.11 Update log book<br>2.7.12 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>2.7.13 Tidy up working area |

**COMPETENCY : 3** Repair disc brake assembly

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 3. Repair disc brake assembly      |     | 3.1. Obtain Disc Brake Service Manual        | 3.1.1 Sources of disc brake service manual<br>3.1.2 Procedures of acquiring disc brake service manual<br>3.1.3 Disc brake service manual<br>3.1.4 Determine source of disc brake service manual<br>3.1.5 Acquire disc brake service manual<br>3.1.6 Interpret disc brake service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|                                    |     | 3.2. Remove Tractor Wheel                    | 3.2.1 Types of tractor wheel<br>3.2.2 Types of jacking equipment<br>3.2.3 Procedure of removing tractor wheel<br>3.2.4 Determine types of tractor wheel<br>3.2.5 Jack tractor to appropriate height<br>3.2.6 Apply removing tractor wheel procedure<br>3.2.7 Careful when lifting up equipment<br>3.2.8 To remove the wheels, block both front and rear equipment |

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|  |  | <p>3.3. Dismantle Disc Brake Components</p> | <p>3.3.1 Types of braking system</p> <p>3.3.2 Operation of disc brake systemDisc brake piping system</p> <p>3.3.3 Dismantling disc brake components procedure</p> <p>3.3.4 Procedure of dismantling disc brake components</p> <p>3.3.5 Spraying disc brake components with pressured air</p> <p>3.3.6 Determine types of braking system</p> <p>3.3.7 Determine operation of disc brake system</p> <p>3.3.8 Disconnect disc brake pipe line</p> <p>3.3.9 Disassemble disc brake components such as</p> <ul style="list-style-type: none"> <li>• Brake caliper assembly</li> <li>• Brake pads</li> <li>• Piston and seals</li> </ul> <p>3.3.10 Apply dismantling disc brake components procedure</p> <p>3.3.11 Spray disc brake components with pressured air</p> <p>3.3.12 Use non-flammable non-toxic proprietary solvents as cleaning agents</p> |
|  |  | <p>3.4. Check Disc Brake Components</p>     | <p>3.4.1 Types of disc brake components defect</p> <p>3.4.2 Checking disc brake components defect procedure</p> <p>3.4.3 Types of measuring equipment</p> <p>3.4.4 Checking brake caliper from crack</p> <p>3.4.5 Inspect pads condition such as</p> <ul style="list-style-type: none"> <li>• Thickness</li> <li>• Oily</li> <li>• Burn</li> <li>• Crack</li> </ul> <p>3.4.6 Inspect brake caliper from crack</p> <p>3.4.7 Inspect disc condition from scratch, crack and distortion</p> <p>3.4.8 Use measuring equipment</p> <p>3.4.9 Meticulous when inspect disc brake defective parts</p>   |

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|  |  | <b>3.5. Assemble Disc Brake Components</b> | 3.5.1 Function of braking system<br>3.5.2 Operation of disc brake system<br>3.5.3 Assemble disc brake components procedure<br>3.5.4 Types of brake fluid<br>3.5.5 Bleeding air from disc brake system method<br>3.5.6 Changing pad and piston seals<br>3.5.7 Connecting disc brake pipe line<br>3.5.8 Determine function of braking system<br>3.5.9 Determine operation of disc brake system<br>3.5.10 Reassemble disc brake components<br>3.5.11 Change pad and piston seals<br>3.5.12 Connect disc brake pipe line<br>3.5.13 Apply assembling disc brake components procedure<br>3.5.14 Bleed air from brake system<br>3.5.15 Avoid splash brake fluid to skin, floor and eyes |
|  |  | <b>3.6. Install Tractor Wheel</b>          | 3.6.1 Types of tractor wheel<br>3.6.2 Types of jacking equipment<br>3.6.3 Installing tractor wheel procedure<br>3.6.4 Determine types of tractor wheel<br>3.6.5 Apply installing tractor wheel procedure<br>3.6.6 Release tractor jack<br>3.6.7 Avoid splash brake fluid to skin, floor and eyes   |

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|  |  | <b>3.7. Test Brake Performance</b> | 3.7.1 Disc brake inspection procedure<br>3.7.2 Updating log book<br>3.7.3 Brake system and ensure tires lock<br>3.7.4 Checking system from leakage<br>3.7.5 Apply disc brake inspection procedure<br>3.7.6 Apply brake system and ensure tires lock<br>3.7.7 Inspect system from leakage<br>3.7.8 Update log book<br>3.7.9 Meticulous when filling service checklist form<br>3.7.10 Tidy up working area<br>3.7.11 Keep work areas clean, uncluttered and free of spills |
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**COMPETENCY 4:** Repair multiple disc brake assembly

| CONTENT STANDARD<br>performance        | Hrs | LEARNING STANDARD<br>performance , condition   | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|--|---|
| 4. Repair multiple disc brake assembly |     | 4.1. Obtain Multiple Disc Brake Service Manual | 4.1.1 Sources of multiple disc brake service manual<br>4.1.2 Procedures of acquiring multiple disc brake service manual<br>4.1.3 Multiple disc brake service manual<br>4.1.4 Determine source of multiple disc brake service manual<br>4.1.5 Acquire multiple disc brake service manual<br>4.1.6 Interpret multiple disc brake service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual |
|  |     | 4.2. Remove Machine Wheel                      | 4.2.1 Types of machine wheel<br>4.2.2 Types of jacking equipment<br>4.2.3 Removing machine wheel procedure<br>4.2.4 Determine types of machine wheel<br>4.2.5 Jack machine to appropriate height<br>4.2.6 Apply removing machine wheel procedure<br>4.2.7 Careful when lifting up equipment<br>4.2.8 To remove the wheels, block both front and rear equipment  |

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|  |  | <p>4.3. Dismantle Multiple Disc Brake Components</p> | <p>4.3.1 Types of braking system</p> <p>4.3.2 Operation of multiple disc brake system</p> <p>4.3.3 Multiple disc brake piping system</p> <p>4.3.4 Dismantling multiple disc brake components procedure</p> <p>4.3.5 Determine types of braking system</p> <p>4.3.6 Determine operation of multiple disc brake system/ mechanical brake</p> <p>4.3.7 Disconnect multiple disc brake pipe line</p> <p>4.3.8 Disassemble multiple disc brake components such as</p> <ul style="list-style-type: none"> <li>• Brake caliper assembly</li> <li>• Brake pads</li> <li>• Piston and seals</li> </ul> <p>4.3.9 Apply dismantling multiple disc brake components procedure</p> <p>4.3.10 Spray multiple disc brake components with pressured air</p> <p>4.3.11 Ensure good ventilation when using compressed air</p> <p>4.3.12 Use mask where asbestos are present avoid blowing air</p> |
|  |  | <p>4.4. Check Multiple Disc Brake Components</p>     | <p>4.4.1 Types of multiple disc brake components defect</p> <p>4.4.2 Checking multiple disc brake components defect procedure</p> <p>4.4.3 Types of measuring equipment</p> <p>4.4.4 Inspect pads condition such as</p> <p>4.4.5 Thickness</p> <p>4.4.6 Oily</p> <p>4.4.7 Burn</p> <p>4.4.8 Crack</p> <p>4.4.9 Inspect brake caliper from crack</p> <p>4.4.10 Inspect disc condition from scratch, crack and distortion</p> <p>4.4.11 Use measuring equipment</p> <p>4.4.12 Meticulous when inspect disc brake defective parts</p>  |

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|  |  | <p>4.5. Assemble Multiple Disc Brake Components</p> | <p>4.5.1 Function of braking system</p> <p>4.5.2 Operation of multiple disc brake system</p> <p>4.5.3 Assemble multiple disc brake components procedure</p> <p>4.5.4 Types of brake fluid</p> <p>4.5.5 Bleeding air from multiple disc brake system method</p> <p>4.5.6 Determine function of braking system</p> <p>4.5.7 Determine operation of multiple disc brake system</p> <p>4.5.8 Reassemble multiple disc brake components</p> <p>4.5.9 Change pad and piston seals</p> <p>4.5.10 Connect multiple disc brake pipe line</p> <p>4.5.11 Apply assembling multiple disc brake components procedure</p> <p>4.5.12 Bleed air from brake system</p> <p>4.5.13 Ensure good ventilation when using compressed air</p> <p>4.5.14 Wear safety glasses with side guards when cleaning parts using compressed air.</p> |
|  |  | <p>4.6. Install Machine Wheel</p>                   | <p>4.6.1 Types of machine wheel</p> <p>4.6.2 Types of jacking equipment</p> <p>4.6.3 Installing machine wheel procedure</p> <p>4.6.4 Determine types of machine wheel</p> <p>4.6.5 Apply installing machine wheel procedure</p> <p>4.6.6 Release machine jack</p> <p>4.6.7 Periodically check for possible damage to the rims or tires</p>   |
|  |  | <p>4.7. Test Brake Performance</p>                  | <p>4.7.1 Multiple disc brake inspection procedure</p> <p>4.7.2 Updating log book</p> <p>4.7.3 Apply multiple disc brake inspection procedure</p> <p>4.7.4 Apply brake system and ensure tires lock</p> <p>4.7.5 Inspect system from leakage</p> <p>4.7.6 Tidy up working area</p> <p>4.7.7 Update log book</p> <p>4.7.8 Meticulous when filling service checklist form</p> <p>4.7.9 Keep work areas clean, uncluttered and free of spills</p>  |



**COMPETENCY 5: Repair brake master cylinder**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition     | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 5. Repair brake master cylinder |     | 5.1. Obtain Brake Master Cylinder Service Manual | 5.1.1 Sources of brake master cylinder service manual<br>5.1.2 Procedures of acquiring brake master cylinder service manual<br>5.1.3 Brake master cylinder service manual<br>5.1.4 Determine source of brake master cylinder service manual<br>5.1.5 Acquire brake master cylinder service manual<br>5.1.6 Interpret brake master cylinder service manual<br>5.1.7 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 5.2. Remove Brake Master Cylinder Assembly       | 5.2.1 Types of brake master cylinder<br>5.2.2 Function of brake master cylinder<br>5.2.3 Operation of brake master cylinder<br>5.2.4 Methods of removing brake master cylinder assembly<br>5.2.5 Disconnecting external piping<br>5.2.6 Uninstalling brake master cylinder assembly<br>5.2.7 Determine types of brake master cylinder<br>5.2.8 Determine function of brake master cylinder<br>5.2.9 Determine operation of brake master cylinder<br>5.2.10 Drain brake fluid<br>5.2.11 Disconnect external piping<br>5.2.12 Uninstall brake master cylinder assembly<br>5.2.13 Follow procedure of removing brake master cylinder assembly<br>5.2.14 Avoid splash brake fluid to skin, floor and eyes |

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|  |  | 5.3. Dismantle Brake Master Cylinder Component | 5.3.1 Determine function of brake master cylinder components<br>5.3.2 Procedure of dismantling brake master cylinder components<br>5.3.3 Disassembling brake master cylinder components<br>5.3.4 Spraying brake master cylinder components with compressed air<br>5.3.5 Determine function of brake master cylinder components<br>5.3.6 Apply dismantling brake master cylinder procedure<br>5.3.7 Disassemble brake master cylinder components<br>5.3.8 Spray brake master cylinder components with compressed air<br>5.3.9 Avoid splash brake fluid to skin, floor and eyes                   |
|  |  | 5.4. Check Brake Master Cylinder Component     | 5.4.1 Types of brake master cylinder components defect<br>5.4.2 Procedure of checking brake master cylinder components defect<br>5.4.3 Changing brake master cylinder components defective parts<br>5.4.4 Checking brake master cylinder components from defect<br>5.4.5 Conscientious when measure wear parts<br>5.4.6 Determine types of brake master cylinder components defect<br>5.4.7 Inspect brake master cylinder components from defect<br>5.4.8 Follow procedure of checking brake master cylinder components defect<br>5.4.9 Change brake master cylinder components defective parts |

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|  |  | 5.5. Assemble Brake Master Cylinder Component | 5.5.1 Function of brake master cylinder components<br>5.5.2 Procedure of assembling brake master cylinder components<br>5.5.3 Determine function of brake master cylinder components<br>5.5.4 Follow procedure of assembling brake master cylinder components<br>5.5.5 Ensure good ventilation when using compressed air<br>5.5.6 Wear safety glasses with side guards when cleaning parts using compressed air.   |
|  |  | 5.6. Install Brake Master Cylinder Assembly   | 5.6.1 Types of brake master cylinder<br>5.6.2 Function of brake master cylinder<br>5.6.3 Operation of brake master cylinder<br>5.6.4 Installing brake master cylinder assembly<br>5.6.5 Procedure of installing brake master cylinder assembly<br>5.6.6 Bleeding air from brake system method<br>5.6.7 Topping up brake fluid procedure<br>5.6.8 Connecting external piping method<br>5.6.9 Determine types of brake master cylinder<br>5.6.10 Determine function of brake master cylinder<br>5.6.11 Determine operation of brake master cylinder<br>5.6.12 Reinstall brake master cylinder assembly<br>5.6.13 Connect external piping<br>5.6.14 Apply installing brake master cylinder assembly procedure<br>5.6.15 Top up brake fluid<br>5.6.16 Bleed air from brake system<br>5.6.17 Avoid splash brake fluid to skin, floor and eyes |

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|  |  | <p>5.7. Test Brake Master Cylinder Performance</p> | <p>5.7.1 Brake master cylinder inspection procedure</p> <p>5.7.2 Brake system performance</p> <p>5.7.3 Update log book</p> <p>5.7.4 Inspect brake master cylinder system such as</p> <ul style="list-style-type: none"> <li>• Abnormal sound</li> <li>• Leakage</li> <li>• Smooth running</li> </ul> <p>5.7.5 Apply brake master cylinder inspection procedure</p> <p>5.7.6 Update log book</p> <p>5.7.7 Meticulous when filling service checklist form</p> <p>5.7.8 Keep work areas clean, uncluttered and free of spills</p> <p>5.7.9 Tidy up working area</p> |
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**COMPETENCY 6:** Repair hydraulic pump

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 6. Repair hydraulic pump        |     | 6.1. Obtain Hydraulic Pump Service Manual    | 6.1.1 Source of hydraulic pump service manual<br>6.1.2 Procedures of acquiring hydraulic pump service manual<br>6.1.3 Hydraulic pump service manual<br>6.1.4 Determine source of hydraulic pump service manual<br>6.1.5 Acquire hydraulic pump service manual<br>6.1.6 Interpret hydraulic pump service manual<br>6.1.7 Interpret hydraulic pump circuit<br>6.1.8 Carefully read and observe precaution warnings given by manual |
|                                 |     | 6.2. Remove Hydraulic Pump                   | 6.2.1 Types of hydraulic pump<br>6.2.2 Hydraulic system<br>6.2.3 Types of hydraulic oil<br>6.2.4 Procedure of removing hydraulic pump<br>6.2.5 Determine types of hydraulic pump<br>6.2.6 Depressurize hydraulic system<br>6.2.7 Disconnect hydraulic linkages<br>6.2.8 Uninstall hydraulic pump assembly<br>6.2.9 Plug hoses and piping end for safety  |

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|  |  | 6.3. Dismantle Pump Components | 6.3.1 Procedure of dismantling hydraulic pump parts and components<br>6.3.2 Types of solvent<br>6.3.3 Disassemble pump parts and components<br>6.3.4 Washing pump parts and component with solvent<br>6.3.5 Uninstalling cap screws and washers<br>6.3.6 Mark pump end cover<br>6.3.7 Uninstall cap screws and washers<br>6.3.8 Lift off pump port and cover<br>6.3.9 Determine disassemble pump parts and components<br>6.3.10 Wash pump parts and component with solvent<br>6.3.11 Meticulous when removing internal parts of pump |
|  |  | 6.4. Check Pump Components     | 6.4.1 Types of hydraulic pump components defect<br>6.4.2 Procedure of inspection of pumping element from defect<br>6.4.3 Measuring bearing from roughness, excessive wear and damage races technique<br>6.4.4 Changing oil seals, "O" rings and bearing<br>6.4.5 Scrap pump parts' cavities<br>6.4.6 Inspect pumping element from defect<br>6.4.7 Inspect bearing from roughness, excessive wear and damage races<br>6.4.8 Change oil seals, "O" rings and bearing<br>6.4.9 Meticulous when placing "O" ring                         |
|  |  | 6.5. Assemble Pump Components  | 6.5.1 Procedure of assembling pump parts and components<br>6.5.2 Inserting pump port and cover technique<br>6.5.3 Confirming pump end cover marking<br>6.5.4 Tightening cap screws and washers<br>6.5.5 Reassemble pump parts and components<br>6.5.6 Insert pump port and cover<br>6.5.7 Confirm pump end cover marking<br>6.5.8 Tighten cap screws and washers   |

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|  |  | 6.6. Install Hydraulic Pump          | 6.6.1 Types of hydraulic pump<br>6.6.2 Installing hydraulic pump procedure<br>6.6.3 Fixing hydraulic linkages<br>6.6.4 Determine types of hydraulic pump<br>6.6.5 Reinstall hydraulic pump assembly<br>6.6.6 Fix hydraulic linkages<br>6.6.7 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction   |
|  |  | 6.7. Test Hydraulic Pump Performance | 6.7.1 Engine starting procedure<br>6.7.2 Operating hydraulic system<br>6.7.3 Testing hydraulic pump performance<br>6.7.4 Inspecting system from leakage<br>6.7.5 Switching off engine<br>6.7.6 Updating log book<br>6.7.7 Apply engine starting procedure<br>6.7.8 Operate hydraulic pump system<br>6.7.9 Apply testing hydraulic pump performance<br>6.7.10 Inspect system from leakage<br>6.7.11 Switch off engine<br>6.7.12 Update log book<br>6.7.13 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>6.7.14 Meticulous when filling service checklist form<br>6.7.15 Keep work areas clean, uncluttered and free of spills<br>6.7.16 Tidy up working area |

**COMPETENCY 7: Service hydraulic control valves**

| CONTENT STANDARD<br>performance     | Hrs | LEARNING STANDARD<br>performance , condition        | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|-------------------------------------|-----|---|--|
| 7. Service hydraulic control valves |     | 7.1. Obtain Hydraulic Control Valves Service Manual | 7.1.1 Source of hydraulic control valves service manual<br>7.1.2 Procedures of acquiring hydraulic control valves service manual<br>7.1.3 Hydraulic control valves service manual<br>7.1.4 Determine source of hydraulic control valves service manual<br>7.1.5 Acquire hydraulic control valves service manual<br>7.1.6 Interpret hydraulic control valves service manual<br>7.1.7 Interpret hydraulic control valves circuit<br>7.1.8 Carefully read and observe precaution warnings given by manual |
|                                     |     | 7.2. Remove Hydraulic Control Valves                | 7.2.1 Types of hydraulic valves<br>7.2.2 Hydraulic control valves<br>7.2.3 Types of hydraulic oil<br>7.2.4 Procedure of removing hydraulic control valves<br>7.2.5 Determine types of hydraulic control valves<br>7.2.6 Depressurize hydraulic system<br>7.2.7 Disconnect hydraulic linkages<br>7.2.8 Uninstall hydraulic control valves<br>7.2.9 Plug hoses and piping end for safety   |
|                                     |     | 7.3. Dismantle Hydraulic Control Valves Components  | 7.3.1 Type of hand tools<br>7.3.2 Procedure of dismantling hydraulic control valves parts and components<br>7.3.3 Choose type of hand tools<br>7.3.4 Disassemble hydraulic control valve components in sequence<br>7.3.5 Meticulous when removing internal parts of control valves   |



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|  |  | 7.4. Check Control Valves Components    | <p>7.4.1 Types of hydraulic control valves components defect</p> <p>7.4.2 Procedure of Inspection of control valves from defect</p> <p>7.4.3 Measuring worn out parts technique</p> <p>7.4.4 Changing defect parts</p> <p>7.4.5 Determine types of hydraulic control valves components defect</p> <p>7.4.6 Inspect control valves components defects</p> <p>7.4.7 Measure worn out parts</p> <p>7.4.8 Change defect parts</p> <p>7.4.9 Meticulous when removing internal parts of control valves</p> |
|  |  | 7.5. Assemble Control Valves Components | <p>7.5.1 Procedure of assembling control valves parts and components</p> <p>7.5.2 Inserting control valves inner parts technique</p> <p>7.5.3 Follow procedure of reassembling control valves parts and components</p> <p>7.5.4 Insert control valves inner parts</p> <p>7.5.5 Meticulous when removing internal parts of control valves</p>   |
|  |  | 7.6. Install Hydraulic Control Valves   | <p>7.6.1 Types of hydraulic control valves</p> <p>7.6.2 Function of hydraulic control valves</p> <p>7.6.3 Method of reinstalling hydraulic control valves assembly</p> <p>7.6.4 Determine types of hydraulic control valves</p> <p>7.6.5 Apply method reinstall hydraulic control valves assembly</p> <p>7.6.6 Fix hydraulic linkages</p> <p>7.6.7 Meticulous when removing internal parts of control valves</p>   |

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|  |  | <p><b>7.7. Test Hydraulic Pump Performance</b></p> | <p>7.7.1 Engine starting procedure</p> <p>7.7.2 Operating hydraulic system</p> <p>7.7.3 Procedure of testing hydraulic performance</p> <p>7.7.4 Apply engine starting procedure and set to manufacturer recommended load</p> <p>7.7.5 Hydraulic flow in different situation such as</p> <ul style="list-style-type: none"> <li>• Zero pressure</li> <li>• 250 p.s.i</li> </ul> <p>7.7.6 Checking system from leakage</p> <p>7.7.7 Switching of engine</p> <p>7.7.8 Updating log book</p> <p>7.7.9 Setup flow meter at outlet port of reservoir</p> <p>7.7.10 Operate hydraulic control valves system or implement function</p> <p>7.7.11 Open hydraulic tester load valve</p> <p>7.7.12 Apply procedure of engine starting and set to manufacturer recommended load</p> <p>7.7.13 Determine hydraulic flow in different situation</p> <p>7.7.14 Inspect system from leakage</p> <p>7.7.15 Switch of engine</p> <p>7.7.16 Update log book</p> <p>7.7.17 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>7.7.18 Meticulous when filling service checklist form</p> <p>7.7.19 Keep work areas clean, uncluttered and free of spills</p> <p>7.7.20 Tidy up working area</p> |
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**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **FUEL SYSTEM REPAIR**  
**MODULE CODE** : **CAAM 308**  
**LEVEL** : **2**  
**SEMESTER** : **3**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 4 hr/week (P)  
5 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Service fuel injector
- Troubleshoot fuel system problems
- Overhaul fuel injection pump
- Carry out installing engine assembly
- Repair distributor unit

## MODULE DESCRIPTION

This unit identifies the competence required to service fuel injector using hand tool set, cleaning kit, torque wrench, injector tester, service manual and shims so that fuel injector service manual obtained, fuel injector unit removed, fuel injector parts dismantled, fuel injector parts cleaned, fuel injector parts assembled, fuel injector unit tested, fuel injector unit installed and engine performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to troubleshoot fuel system problems using customer complaint form, hand tool set, fuel fault-finding chart, fuel system service manual, check sheet, new spare parts so that fuel system service manual obtained, fuel system problems checked, fuel system problems rectified, rectified fuel system problems tested and troubleshooting checklist recorded in accordance with standard operating procedure.

This unit identifies the competence required to overhaul fuel injection pump using hand tool set, calibration machine, fuel injection pump service manual, calibration pump service manual, puller and special tools so that fuel injection pump service manual obtained, fuel injection pump removed, fuel injection pump components dismantled, fuel injection pump components checked, fuel injection pump components assembled, bench test executed and fuel injection pump installed in accordance with manufacturer's specification.

This unit identifies the competence required to carry out installing engine assembly using hand tools set, hydraulic jack, detergent, engine manual, rags, wheel stopper and lifting equipment so that job order obtained, engine assembly installed and external attachment connected in accordance with engine's specification.

This unit identifies the competence required to repair distributor unit using hand tools set, distributor unit service manual, new contact breaker point, test lamp, service checklist and log book so that distributor unit service manual obtained, distributor assembly removed, distributor

components dismantled, distributor components checked, distributor components assembled, distributor assembly installed and engine performance tested in accordance with manufacturer's specification

DRAFT

## CONTENT AND LEARNING STANDARD

**Programme : AGRICULTURAL MECHANIZATION**

**Module 7: FUEL AND ELECTRICAL SYSTEM REPAIR**

**COMPETENCY 1: Service fuel injector**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|--|--|
| 1 Service fuel injector            |     | 1.1 Obtain fuel injector Service manual      | 1.1.1 Determine source of fuel injector service manual<br>1.1.2 Acquire fuel injector service manual<br>1.1.3 Interpret fuel injector service manual<br>1.1.4 Carefully read and observe precaution warnings given by manual   |
|                                    |     | 1.2 Remove fuel injector unit                | 1.2.1 Type of fuel injectors<br>1.2.2 Basic operation of fuel injector unit<br>1.2.3 Type of hand tools<br>1.2.4 Techniques of removing fuel injector unit<br>1.2.5 Determine types of fuel injector<br>1.2.6 Determine basic operation of fuel injector unit<br>1.2.7 Choose type of hand tools<br>1.2.8 Apply removing fuel injector unit technique<br>1.2.9 Disconnect battery terminal before executing any works related to fuel system |

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|  |  | 1.3 Dismantle fuel injector parts | 1.3.1 Type of fuel injector parts<br>1.3.2 Techniques of dismantling fuel injector parts<br>1.3.3 Methods of disassemble fuel injector parts<br>1.3.4 Meticulous when removing injector nozzle<br>1.3.5 Determine type of fuel injector parts<br>1.3.6 Apply dismantling fuel injector parts technique<br>1.3.7 Disassemble fuel injector parts<br>1.3.8 Do not wear rings, wristwatches, jewels and unbuttoned clothing                 |
|  |  | 1.4 Clean fuel injector parts     | 1.4.1 Types of solvent<br>1.4.2 Functions of solvent<br>1.4.3 Techniques of cleaning fuel injector part<br>1.4.4 Spraying fuel injector parts with pressure air<br>1.4.5 Choose types of solvent<br>1.4.6 Soak fuel injector parts with solvent<br>1.4.7 Spray fuel injector parts with pressure air<br>1.4.8 Apply cleaning fuel injector parts technique<br>1.4.9 Do not use petrol, paraffin or other solvent to remove oil from skin |
|  |  | 1.5 Assemble fuel injector parts  | 1.5.1 Function of fuel injector parts<br>1.5.2 Procedures of assembling fuel injector parts<br>1.5.3 Methods of reassemble fuel injector parts<br>1.5.4 Determine function of fuel injector parts<br>1.5.5 Apply assembling fuel injector parts procedure<br>1.5.6 Determine reassemble fuel injector parts<br>1.5.7 Never use special tools for any purpose other than that for which they were designed                                |

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|  |  | 1.6 Test fuel injector unit    | <p>1.6.1 Type of injector tester</p> <p>1.6.2 Type of shims</p> <p>1.6.3 Type of fuel spray</p> <p>1.6.4 Breakage pressure</p> <p>1.6.5 Methods of testing fuel injector unit</p> <p>1.6.6 Determine type of injector tester</p> <p>1.6.7 Clamp injector at injector tester</p> <p>1.6.8 Apply testing fuel injector unit method such as</p> <ul style="list-style-type: none"> <li>• Breakage pressure</li> <li>• Type of fuel spray</li> </ul> <p>1.6.9 Add/remove shims</p> <p>1.6.10 Keep testing result</p> <p>1.6.11 Careful when doing testing works, fuel may splitting to the eyes</p> |
|  |  | 1.7 Install fuel injector unit | <p>1.7.1 Function of fuel injector unit</p> <p>1.7.2 Techniques of installing fuel injector unit</p> <p>1.7.3 Methods of reinstalling fuel injector units</p> <p>1.7.4 Determine function of fuel injector unit</p> <p>1.7.5 Apply assembling fuel injector unit technique</p> <p>1.7.6 Apply method of reinstalling fuel injector units</p> <p>1.7.7 Carefully read and observe precaution warnings given by manual</p>  |



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|  |  | <p>1.8 Test engine performance</p> | <p>1.8.1 Engine starting procedure</p> <p>1.8.2 Leakage inspection procedure</p> <p>1.8.3 Engine idling Revolution Per Minute(RPM)</p> <p>1.8.4 Methods of testing engine performance</p> <p>1.8.5 Updating log book</p> <p>1.8.6 Apply engine starting procedure</p> <p>1.8.7 Inspect engine leakage</p> <p>1.8.8 Tune engine idling Revolution Per Minute(RPM)</p> <p>1.8.9 Apply testing engine performance method</p> <p>1.8.10 Update log book</p> <p>1.8.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>1.8.12 Tidy up working area</p> |
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**COMPETENCY 2: Troubleshoot fuel system problems**

| CONTENT<br>STANDARD<br>performance  | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|-------------------------------------|-----|--|--|
| 2 Troubleshoot fuel system problems |     | 2.1 Obtain fuel system service manual        | 2.1.1 Sources of fuel system service manual<br>2.1.2 Procedures of acquiring fuel system service manual<br>2.1.3 Fuel system service manual<br>2.1.4 Determine source of fuel system service manual<br>2.1.5 Acquire fuel system service manual<br>2.1.6 Interpret fuel system service manual<br>2.1.7 Read and observe precaution warnings given by manual  |
|                                     |     | 2.2 Check fuel system problems               | 2.2.1 Procedures of guessing possible root cause<br>2.2.2 Root cause of fuel system fault<br>2.2.3 Fuel system analyzer equipment<br>2.2.4 Procedures of testing engine performance<br>2.2.5 Follow procedure of guest possible root cause<br>2.2.6 Determine root cause of fuel system fault<br>2.2.7 Change fuel system defect parts<br>2.2.8 Follow procedure of testing engine performance<br>2.2.9 Meticulous when connecting engine analyzer cable to battery terminal<br>2.2.10 Keep work areas clean, uncluttered and free of spills |

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|  |  | 2.3 Rectify fuel system problems | 2.3.1 Types of fuel system problems<br>2.3.2 Techniques of engine rectification<br>2.3.3 Engine rectification procedures<br>2.3.4 Techniques special tool handling<br>2.3.5 Determine type of fuel system problem<br>2.3.6 Apply technique of engine rectification<br>2.3.7 Follow engine rectification procedure<br>2.3.8 Apply technique of handling special tool<br>2.3.9 Meticulous in inspecting engine<br>2.3.10 Proper usage of service manual  |
|  |  | 2.4 Test rectified fuel system   | 2.4.1 Fuel system requirements<br>2.4.2 Methods of fuel system testing<br>2.4.3 Procedures of fuel system testing<br>2.4.4 Technique of handling testing tool<br>2.4.5 Determine fuel system testing requirements<br>2.4.6 Apply method of fuel system testing<br>2.4.7 Follow procedure of fuel system testing<br>2.4.8 Apply technique of handling testing tool<br>2.4.9 Meticulous when connecting engine analyzer cable to battery terminal<br>2.4.10 Keep work areas clean, uncluttered and free of spills<br>2.4.11 Careful when doing testing works, fuel may splitting to the eyes |

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|  |  | <p>2.5 Record troubleshooting checklist</p> | <p>2.5.1 Types of troubleshooting checklist</p> <p>2.5.2 Technique of fill in troubleshooting checklist</p> <p>2.5.3 Types of troubleshooting service checklist</p> <p>2.5.4 Procedures of recording troubleshooting checklist</p> <p>2.5.5 Filing of troubleshooting checklist</p> <p>2.5.6 Compiling troubleshooting checklist record method</p> <p>2.5.7 Determine types of troubleshooting checklist</p> <p>2.5.8 Follow technique of filling troubleshooting checklist</p> <p>2.5.9 Fill in troubleshooting checklist</p> <p>2.5.10 Determine types of service checklist</p> <p>2.5.11 File troubleshooting checklist record</p> <p>2.5.12 Apply compiling troubleshooting checklist record method</p> <p>2.5.13 Accuracy of recording history record</p> <p>2.5.14 Meticulous when filling service checklist form</p> |
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**COMPETENCY 3: Overhaul fuel injection pump**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition  | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|---|---|
| 3 Overhaul fuel injection pump     |     | 3.1 Obtain fuel injection pump service manual | 3.1.1 Source of fuel injector service manual<br>3.1.2 Procedures of acquiring fuel injector service manual<br>3.1.3 Fuel injector service manual<br>3.1.4 Determine source of fuel injector service manual<br>3.1.5 Acquire fuel injector service manual<br>3.1.6 Interpret fuel injector service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual  |
|                                    |     | 3.2 Remove fuel injection pump                | 3.2.1 Type of hand tools<br>3.2.2 Operation of fuel injection pump assembly<br>3.2.3 Type of high pressure pipes<br>3.2.4 Methods of removing fuel injection pump<br>3.2.5 Choose hand tools<br>3.2.6 Determine operation of fuel injection pump assembly<br>3.2.7 Uninstall high pressure pipes connection<br>3.2.8 Apply removing fuel injection pump method<br>3.2.9 Disconnect battery terminal before executing any works related to fuel system |

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|  |  | <p>3.3 Dismantle fuel injection pump components</p> | <p>3.3.1 Fuel injection pump components<br/> 3.3.2 Operation of pump governor<br/> 3.3.3 Fuel injection pump<br/> 3.3.4 Methods of dismantling fuel injection pump<br/> 3.3.5 Soaking fuel injection pump components with solvent<br/> 3.3.6 Techniques of disassemble pump camshaft<br/> 3.3.7 Moving out lifter<br/> 3.3.8 Determine fuel injection pump components<br/> 3.3.9 Disassemble pump governor<br/> 3.3.10 Disassemble injector plunger<br/> 3.3.11 Move out lifter<br/> 3.3.12 Disassemble pump camshaft<br/> 3.3.13 Apply method of dismantling fuel injection pump<br/> 3.3.14 Soak fuel injection pump components with solvent<br/> 3.3.15 Never use tools or equipment for any purpose other than that for which they were designed</p> |
|  |  | <p>3.4 Check fuel injection pump components</p>     | <p>3.4.1 Type of fuel injection pump components defect<br/> 3.4.2 Methods of checking fuel injection pump components from wear and tear<br/> 3.4.3 Techniques of changing defect parts<br/> 3.4.4 Inspect fuel injection pump components defect<br/> 3.4.5 Apply checking fuel injection pump components from wear and tear method<br/> 3.4.6 Change defect parts</p>  |

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|  |  | 3.5 Assemble fuel injection pump components | 3.5.1 Types of housing bearing<br>3.5.2 Types camshaft and fly weight<br>3.5.3 Setting lifter units procedure<br>3.5.4 Tighten plunger and bushing method<br>3.5.5 Reinstalling pump governor technique<br>3.5.6 Methods of assembling fuel injection pump component<br>3.5.7 Change housing bearing<br>3.5.8 Place camshaft and fly weight in position<br>3.5.9 Place lifter units<br>3.5.10 Tighten plunger and bushing to required torque<br>3.5.11 Reinstall pump governor<br>3.5.12 Apply method of assembling fuel injection pump component<br>3.5.13 Accuracy when setting torque wrench                                      |
|  |  | 3.6 Execute bench test                      | 3.6.1 Fuel injection pump bench test procedure<br>3.6.2 Fuel injection pump calibration method<br>3.6.3 Calibration service manual<br>3.6.4 Justification of bench test result<br>3.6.5 Procedure of fuel injection pump bench test<br>3.6.6 Connecting gauges at oil line and fuel line<br>3.6.7 Fix pump assembly on bench test<br>3.6.8 Connect gauges at oil line and fuel line<br>3.6.9 Apply method of pump calibration<br>3.6.10 Compare data with calibration service manual<br>3.6.11 Justify bench test result<br>3.6.12 Follow procedure of fuel injection pump bench test<br>3.6.13 Meticulous when executing bench test |

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|  |  | <p><b>3.7 Install fuel injection pump</b></p> <p>3.7.1 Types of special tools</p> <p>3.7.2 Methods of Installing fuel injection pump assembly</p> <p>3.7.3 Techniques of reinstall high pressure pipes connection</p> <p>3.7.4 Bleeding air from fuel system</p> <p>3.7.5 Updating log book</p> <p>3.7.6 Choose hand tools</p> <p>3.7.7 Apply installing fuel injection pump assembly method</p> <p>3.7.8 Reinstall high pressure pipes connection</p> <p>3.7.9 Bleed air from system</p> <p>3.7.10 Update log book</p> <p>3.7.11 Meticulous when filling service checklist form</p> <p>3.7.12 Tidy up working area</p> |
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**COMPETENCY 4:** Carry out installing engine assembly

| CONTENT<br>STANDARD<br>performance              | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---|-----|--|--|
| 4<br>Carry out<br>installing engine<br>assembly |     | 4.1. Obtain job order                        | 4.1.1. Type of job order<br>4.1.2. Sourcing of job order form<br>4.1.3. Procedure to acquire job order<br>4.1.4. Determine type of job order<br>4.1.5. Source job order form<br>4.1.6. Apply procedure to acquire job order<br>4.1.7. Follow company procedure when obtain job order                   |
|   |     | 4.2. Install engine assembly                 | 4.2.1. Function of lifting equipment<br>4.2.2. Function of hydraulic jack<br>4.2.3. Installing engine assembly procedure<br>4.2.4. Use lifting equipment<br>4.2.5. Use hydraulic jack<br>4.2.6. Apply installing engine assembly procedure<br>4.2.7. Meticulous when fixing engine to gearbox assembly |
|   |     | 4.3. Connect external attachment             | 4.3.1. Type of external attachment<br>4.3.2. Connecting external attachment procedure<br>4.3.3. Determine type of external attachment<br>4.3.4. Apply connecting external attachment procedure<br>4.3.5. Keep work areas clean, uncluttered and free of spills   |

**COMPETENCY 5: Repair distributor unit**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 5 Repair distributor unit          |     | 5.1 Obtain Distributor Unit Service Manual   | 5.1.1 Source of distributor unit service manual<br>5.1.2 Procedure of acquiring distributor unit service manual<br>5.1.3 Distributor unit service manual<br>5.1.4 Determine source of distributor unit service manual<br>5.1.5 Acquire distributor unit service manual<br>5.1.6 Interpret distributor unit service manual<br>5.1.7 Interpret distributor unit circuit<br>5.1.8 Carefully read and observe precaution warnings given by manual   |
|                                    |     | 5.2 Remove Distributor Assembly              | 5.2.1 Types of distributor unit<br>5.2.2 Function of distributor unit<br>5.2.3 Types of high tension cable<br>5.2.4 Procedure of removing distributor assembly<br>5.2.5 Determine types of distributor unit<br>5.2.6 Determine function of distributor unit<br>5.2.7 Disconnect high tension cable<br>5.2.8 Uninstall distributor assembly from engine<br>5.2.9 Apply removing distributor assembly procedure<br>5.2.10 Disconnect battery terminal before executing any works related to removing electrical instruments |

|  |  |                                      |   |
|--|--|--------------------------------------|---|
|  |  | 5.3 Dismantle Distributor Components | 5.3.1 Distributor parts and components<br>5.3.2 Function of contact breaker point<br>5.3.3 Procedure of dismantling distributor parts and components<br>5.3.4 Move out distributor cap<br>5.3.5 Pick out contact breaker point<br>5.3.6 Disassemble distributor parts and components<br>5.3.7 Do not wear rings, wristwatches, jewels and unbuttoned clothing   |
|  |  | 5.4 Check Distributor Components     | 5.4.1 Types of distributor components defects<br>5.4.2 Inspection of distributor components defects procedure<br>5.4.3 Determine types of distributor components defects<br>5.4.4 Inspect distributor components defects<br>5.4.5 Apply checking distributor components defect procedure<br>5.4.6 Handle electrical testing equipment with care   |
|  |  | 5.5 Assemble Distributor Components  | 5.5.1 Distributor parts and components<br>5.5.2 Function of contact breaker point<br>5.5.3 Dismantling distributor parts and components procedure<br>5.5.4 Determine Reassemble distributor parts and components<br>5.5.5 Change new contact breaker point to location<br>5.5.6 Change new distributor oil seal<br>5.5.7 Apply assembling distributor parts and components procedure<br>5.5.8 Meticulous when setting contact breaker point gap |

|  |  |                                  |  |
|--|--|----------------------------------|--|
|  |  | 5.6 Install Distributor Assembly | 5.6.1 Ignition timing diagram<br>5.6.2 Advance and retard timing mechanism<br>5.6.3 Setting contact breaker point gap<br>5.6.4 Installing Move out distributor cap<br>5.6.5 Distributor assembly procedure<br>5.6.6 Determine diagram of ignition system<br>5.6.7 Interpret ignition timing diagram<br>5.6.8 Set compression stroke for number one cylinder<br>5.6.9 Adjust advance and retard timing mechanism<br>5.6.10 Set contact breaker point gap<br>5.6.11 Apply installing distributor assembly procedure<br>5.6.12 Adhere to safety and health procedure  |
|  |  | 5.7 Test Engine Performance      | 5.7.1 Engine starting procedure<br>5.7.2 Testing engine performance technique<br>5.7.3 Engine idling Revolution Per Minute(RPM)<br>5.7.4 Updating log book<br>5.7.5 Apply engine starting procedure<br>5.7.6 Apply testing engine performance technique<br>5.7.7 Tune engine idling Revolution Per Minute(RPM)<br>5.7.8 Update log book<br>5.7.9 Meticulous when filling service checklist form<br>5.7.10 Keep work areas clean, uncluttered and free of spills<br>5.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>5.7.12 Tidy up working area |

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **TRANSMISSION SYSTEM REPAIR**  
**MODULE CODE** : **CAAM 309**  
**LEVEL** : **2**  
**SEMESTER** : **3**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 4 hr/week (P)  
5 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Overhaul manual gear box
- Overhaul transfer box
- Repair power take off assembly
- Overhaul differential assembly
- Overhaul final drive unit
- Overhaul planetary gear system
- Overhaul torque converter
- Overhaul power shift transmission

## MODULE DESCRIPTION

This unit identifies the competence required to overhaul manual gear box using hand tools set, gear box service manual, puller, lifting equipment, measuring equipments, prussian blue, gasket, transmission oil, torque wrench and new oil seal so that gear box service manual obtained, manual gear box removed, gear box components dismantled, gear box components checked, gear box components assembled, manual gear box installed and gear box operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to overhaul transfer box using hand tools set, transfer box service manual, puller, lifting equipment, measuring equipments, prussian blue, gasket, transmission oil, torque wrench and new oil seal so that transfer box service manual obtained, manual transfer box removed, transfer box components dismantled, transfer box components checked, transfer box components assembled, manual transfer box installed and transfer box operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to Repair power take off assembly using hand tools set, power take off service manual, puller, lifting equipment, measuring equipments, Prussian blue, gasket, transmission oil, torque wrench and new oil seal so that power take off service manual obtained, power take off assembly removed, power take off components dismantled, checked and assembled, power take off assembly installed and power take off operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to overhaul differential assembly using hand tools set, hydraulic press, dial testing indicator (DTI), marking blue, differential assembly service manual, differential oil, gasket, solvent and grease so that differential assembly service manual

obtained, differential assembly removed, differential assembly dismantled, differential components checked, differential components assembled, differential assembly installed and differential assembly operations tested in accordance with manufacturer's specification

This unit identifies the competence required to overhaul final drive unit using hand tools set, transfer box service manual, special tools, puller, grease, gasket, lubrication oil and solvent so that final drive service manual obtained, final drive assembly removed, final drive components dismantled, final drive parts and components checked, final drive components assembled, final drive assembly installed and final drive operations tested in accordance with manufacturer's specification

This unit identifies the competence required to overhaul planetary gear system using hand tools set, planetary gear system service manual, jack and support stand and lubrication oil so that planetary gear system service manual identified, planetary gear system removed, planetary gear assembly dismantled, planetary gear components checked, planetary gear assembly assembled, planetary gear system installed and planetary gear operations tested in accordance with manufacturer's specification

This unit identifies the competence required to overhaul torque converter using hand tools set, torque converter service manual, dial testing indicator, torque wrench, torque converter oil, gasket and log book so that torque converter service manual obtained, torque converter assembly removed, torque converter components dismantled, torque converter components checked, torque converter components assembled, torque converter assembly installed and torque converter performance tested in accordance with manufacturer's specification.

This unit identifies the competence required to overhaul power shift transmission using hand tools sets, power shift transmission service manual, special tools, lifting equipment, puller, torque wrench, measuring equipment, and log book so that power shift transmission service manual obtained, power shift transmission assembly removed, power shift transmission components dismantled, components defect inspected, power shift transmission components assembled, power shift transmission assembly installed and power shift transmission performance tested in accordance with manufacturer's specification

## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 9: TRANSMISSION SYSTEM REPAIR

#### COMPETENCY 1: Overhaul manual gear box

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 1. Overhaul manual gear box     |     | 1.1. Obtain Gear Box Service Manual          | 1.1.1 Describe source of gear box service manual<br>1.1.2 Explain procedures of acquiring gear box service manual<br>1.1.3 Describe gear box service manual<br>1.1.4 Determine source of gear box service manual<br>1.1.5 Acquire gear box service manual<br>1.1.6 Interpret gear box service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 1.2. Remove Manual Gear Box                  | 1.2.1 List types of lifting equipment<br>1.2.2 List method of removing transmission unit<br>1.2.3 Unscrewing transmission bolt<br>1.2.4 Moving out transmission unit<br>1.2.5 Disconnect external attachment<br>1.2.6 Fix lifting shackles or support transmission with jack<br>1.2.7 Unscrew transmission bolt<br>1.2.8 Move out transmission unit<br>1.2.9 Do not wear rings, wristwatches, jewels and unbuttoned clothing |



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|--|--|------------------------------------|--|
|  |  | 1.3. Dismantle Gear Box Components | <p>1.3.1 State gear box main components</p> <p>1.3.2 Explain procedure of disassembling gear box parts and components</p> <p>1.3.3 List types of solvent</p> <p>1.3.4 Identify soaking parts and components with solvent</p> <p>1.3.5 Disassemble transmission front cover</p> <p>1.3.6 Disassemble gear box parts and components such as</p> <ul style="list-style-type: none"> <li>• Shifting fork assembly</li> <li>• Interlocking mechanism</li> <li>• Counter shaft assembly</li> <li>• Lay shaft assembly</li> </ul> <p>1.3.7 Soak parts and components with solvent</p> <p>1.3.8 Determine type of solvent</p> <p>1.3.9 Use non-flammable non-toxic proprietary solvents as cleaning agents</p> |
|  |  | 1.4. Check Gear Box Components     | <p>1.4.1 State types of gear box components defect</p> <p>1.4.2 Define checking gear box parts and components procedure</p> <p>1.4.3 Explain measuring teeth contact</p> <p>1.4.4 Determine types of gear box defect</p> <p>1.4.5 Inspect gearbox component defect such as</p> <ul style="list-style-type: none"> <li>• Gear crack or worn-out</li> <li>• Synchronizer units wear or crack</li> <li>• Roughness of bearing</li> <li>• Oil seal broken</li> </ul> <p>1.4.6 Measure teeth contact</p> <p>1.4.7 Conscientious when measure wear parts</p>   |

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|--|--|-----------------------------------|--|
|  |  | 1.5. Assemble Gear Box Components | <p>1.5.1 State operation of gear box assembly</p> <p>1.5.2 List method of reassemble gear box parts and components</p> <p>1.5.3 Identify technique of reassemble transmission front cover</p> <p>1.5.4 State changing gear box defect parts and components</p> <p>1.5.5 Determine operation of gear box assembly</p> <p>1.5.6 Change gear box defect parts and components</p> <p>1.5.7 Apply method of reassemble gear box parts and components</p> <p>1.5.8 Follow method of reassemble transmission front cover</p> <p>1.5.9 Meticulous when assembling gearbox parts and components</p>   |
|  |  | 1.6. Install Manual Gear Box      | <p>1.6.1 List function of lifting equipment</p> <p>1.6.2 List types of gear box oil</p> <p>1.6.3 State function ability of gear box</p> <p>1.6.4 Using lifter to place transmission assembly at location</p> <p>1.6.5 List checking function ability of gear box</p> <p>1.6.6 List method of tightening transmission bolt</p> <p>1.6.7 Use lifter to place transmission assembly at location</p> <p>1.6.8 Slot transmission shaft</p> <p>1.6.9 Tighten transmission bolt</p> <p>1.6.10 Connect external attachments</p> <p>1.6.11 Top up gear box oil</p> <p>1.6.12 Inspect function ability of gear box</p> <p>1.6.13 Meticulous when fixing gearbox assembly</p> |

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|  |  | <b>1.7. Test Gear Box Operations</b> | 1.7.1 Describe engine starting procedure<br>1.7.2 Describe leakage inspect procedure<br>1.7.3 State gear box testing method<br>1.7.4 List Updating log book<br>1.7.5 State checking all level of gear<br>1.7.6 Apply engine starting procedure<br>1.7.7 Inspect engine leakage<br>1.7.8 Apply gear box testing method<br>1.7.9 Try all level of gear<br>1.7.10 Update log book<br>1.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>1.7.12 Tidy up working area |
|--|--|--------------------------------------|---|

**COMPETENCY 2: Overhaul transfer box**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 2. Overhaul transfer box        |     | 2.1. Obtain Transfer Box Service Manual      | 2.1.1 Describe Source of transfer box service manual<br>2.1.2 Procedures of acquiring transfer box service manual<br>2.1.3 Transfer box service manual<br>2.1.4 Determine source of transfer box service manual<br>2.1.5 Acquire transfer box service manual<br>2.1.6 Interpret transfer box service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual  |
|                                 |     | 2.2. Remove Transfer Box Assembly            | 2.2.1 Types of lifting equipment<br>2.2.2 Method of removing transmission unit<br>2.2.3 Technique of unscrew transfer box bolt<br>2.2.4 Moving out transfer box unit<br>2.2.5 Disconnect external attachment<br>2.2.6 Fix lifting shackles or support transfer box with jack<br>2.2.7 Unscrew transfer box bolt<br>2.2.8 Move out transfer box unit<br>2.2.9 Never use tools or equipment for any purpose other than that for which they were designed |
|                                 |     | 2.3. Dismantle Transfer Box Assembly         | 2.3.1 Transfer main components<br>2.3.2 Procedure of disassembling transfer box parts and components<br>Types of solvent<br>2.3.3 Disassemble transfer box front cover<br>2.3.4 Disassemble transfer box parts and components<br>2.3.5 Soak parts and components with solvent<br>2.3.6 Never use gasoline, diesel oil or other flammable liquids as cleaning agents  |

|  |  |                                       |   |
|--|--|---------------------------------------|---|
|  |  | 2.4. Check Transfer Box Components    | <p>2.4.1 Types of transfer box components defect</p> <p>2.4.2 Checking transfer box parts and components procedure</p> <p>2.4.3 Measure teeth contact</p> <p>2.4.4 Determine types of transfer box defect</p> <p>2.4.5 Inspect transfer box component defect such as</p> <ul style="list-style-type: none"> <li>• Gear crack or worm</li> <li>• Synchronizer units wear or crack</li> <li>• Roughness of bearing</li> <li>• Oil seal broken</li> </ul> <p>2.4.6 Measure teeth contact</p> <p>2.4.7 Conscientious when measure wear parts</p>                                      |
|  |  | 2.5. Assemble Transfer Box Components | <p>2.5.1 Operation of transfer box assembly</p> <p>2.5.2 Method of transferring box parts and components</p> <p>2.5.3 Technique of reassemble transfer front cover</p> <p>2.5.4 Changing transfer box defect parts and components</p> <p>2.5.5 Determine operation of transfer box assembly</p> <p>2.5.6 Change transfer box defect parts and components</p> <p>2.5.7 Apply method of Reassemble transfer box parts and components</p> <p>2.5.8 Follow procedure of reassemble transfer front cover</p> <p>2.5.9 Meticulous when assembling transfer box parts and components</p> |

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|--|--|------------------------------------|---|
|  |  | 2.6. Install Transfer Box Assembly | 2.6.1 Function of lifting equipment<br>2.6.2 Types of transfer box oil<br>2.6.3 Method of installing transfer box assembly<br>2.6.4 Connecting external attachments<br>2.6.5 Method of topping up transfer box oil<br>2.6.6 Technique of tighten up transfer box bolt<br>2.6.7 Use lifter to place transfer box assembly at location<br>2.6.8 Slot transmission shaft<br>2.6.9 Tighten transfer box bolt<br>2.6.10 Connect external attachments<br>2.6.11 Top up transfer box oil<br>2.6.12 Apply method of installing transfer box assembly<br>2.6.13 Meticulous when fixing transfer box assembly |
|  |  | 2.7. Test Transfer Box Operations  | 2.7.1 Procedure of engine starting<br>2.7.2 Procedure Leakage inspect<br>2.7.3 Procedure Transfer box testing<br>2.7.4 Trying all level of transfer<br>2.7.5 Updating log book<br>2.7.6 Apply procedure engine starting<br>2.7.7 Inspect engine leakage<br>2.7.8 Apply procedure transfer box testing<br>2.7.9 Try all level of transfer<br>2.7.10 Update log book<br>2.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>2.7.12 Tidy up working area   |

**COMPETENCY 3: Repair power take off assembly**

| CONTENT STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|-----------------------------------|-----|--|---|
| 3. Repair power take off assembly |     | 3.1. Obtain Power Take Off Service Manual    | 3.1.1 Source of power take off service manual<br>3.1.2 Procedures of acquiring power take off service manual<br>3.1.3 Determine source of power take off service manual<br>3.1.4 Acquire power take off service manual<br>3.1.5 Interpret power take off service manual<br>3.1.6 Carefully read and observe precaution warnings given by manual                                   |
|                                   |     | 3.2. Remove Power Take Off Assembly          | 3.2.1 Types of lifting equipment<br>3.2.2 Method of removing transmission unit<br>3.2.3 Technique of unscrew power take off bolt<br>3.2.4 Moving out power take off unit<br>3.2.5 Disconnect external attachment<br>3.2.6 Fix lifting shackles or support power take off with jack<br>3.2.7 Follow technique of unscrew power take off bolt<br>3.2.8 Move out power take off unit |
|                                   |     | 3.3. Dismantle Power Take Off Assembly       | 3.3.1 Power take off main components<br>3.3.2 Disassembling transfer box parts and components procedure<br>3.3.3 Types of solvent<br>3.3.4 Disassemble power take off front cover<br>3.3.5 Disassemble power take off parts and components<br>3.3.6 Soak parts and components with solvent<br>3.3.7 Patient when working at tight area  |

|  |  |   |  |
|--|--|---|--|
|  |  | 3.4. Check Power Take Off Components    | 3.4.1 Types of power take off components defect<br>3.4.2 Checking power take off parts and components procedure<br>3.4.3 Measuring teeth contact<br>3.4.4 Determine types of power take off defect<br>3.4.5 Inspect power take off component defect<br>3.4.6 Measure teeth contact<br>3.4.7 Conscientious when measure wear parts  |
|  |  | 3.5. Assemble Power Take Off Components | 3.5.1 Operation of power take off assembly<br>3.5.2 Method of reassemble power take off parts and components<br>3.5.3 Technique of reassemble power take off front cover<br>3.5.4 Changing power take off defect parts and components<br>3.5.5 Determine operation of power take off assembly<br>3.5.6 Change power take off defect parts and components<br>3.5.7 Follow technique of reassemble power take off parts and components<br>3.5.8 Apply method of reassemble power take off cover<br>3.5.9 Conscientious when measure wear parts |
|  |  | 3.6. Install Power Take Off Assembly    | 3.6.1 Function of lifting equipment<br>3.6.2 Types of power take off oil<br>3.6.3 Function ability of power take off<br>3.6.4 Use lifter to place power take off assembly at location<br>3.6.5 Slot transmission shaft<br>3.6.6 Tighten power take off bolt<br>3.6.7 Connect external attachments<br>3.6.8 Top up power take off oil<br>3.6.9 Try function ability of power take off<br>3.6.10 Conscientious when measure wear parts   |



|  |  |  |   |
|--|--|--|---|
|  |  | <p>3.7. Test Power Take Off Operations</p> | <p>3.7.1 Engine starting procedure</p> <p>3.7.2 Leakage inspect procedure</p> <p>3.7.3 Power take off testing method</p> <p>3.7.4 Trying all level of transfer</p> <p>3.7.5 Updating log book</p> <p>3.7.6 Apply engine starting procedure</p> <p>3.7.7 Inspect engine leakage</p> <p>3.7.8 Apply power take off testing method</p> <p>3.7.9 Try all level of transfer</p> <p>3.7.10 Update log book</p> <p>3.7.11 Meticulous when recording schedule maintenance book</p> <p>3.7.12 Keep work areas clean, uncluttered and free of spills</p> <p>3.7.13 Tidy up working area</p> |
|--|--|--|---|

**COMPETENCY 4: Overhaul differential assembly**

| CONTENT STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition     | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|-----------------------------------|-----|--|--|
| 4. Overhaul differential assembly |     | 4.1. Obtain Differential Assembly Service Manual | 4.1.1 Source of differential assembly service manual<br>4.1.2 Procedures of acquiring differential assembly service manual<br>4.1.3 Differential assembly service manual<br>4.1.4 Determine source of differential assembly service manual<br>4.1.5 Acquire differential assembly service manual<br>4.1.6 Interpret differential assembly service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual   |
|                                   |     | 4.2. Remove Differential Assembly                | 4.2.1 Disconnecting propeller shaft and differential assembly<br>4.2.2 Types of differential oil<br>4.2.3 Types of differential unit<br>4.2.4 Technique of pulling out wheel shaft from centre housing<br>4.2.5 Procedure of removing differential assembly<br>4.2.6 Pulling out wheel shaft from centre housing<br>4.2.7 Disconnect propeller shaft and differential assembly<br>4.2.8 Drain out differential oil<br>4.2.9 Release external components with differential assembly<br>4.2.10 Determine types of differential unit<br>4.2.11 Pull out wheel shaft from centre housing<br>4.2.12 Apply procedure of removing differential assembly |

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|--|--|---|---|
|  |  | <p>4.3. Dismantle Differential Assembly</p> | <p>4.3.1 Function of hydraulic press</p> <p>4.3.2 Differential unit parts and components</p> <p>4.3.3 Procedure of dismantling differential assembly</p> <p>4.3.4 Taking out bearing cone from differential by hydraulic press</p> <p>4.3.5 Method of disassemble gear from spider gear</p> <p>4.3.6 Technique of disassemble case from bevel gear</p> <p>4.3.7 Uninstall pinion shaft by pushing with hydraulic press</p> <p>4.3.8 Mount carrier assembly on suitable stand</p> <p>4.3.9 Disassemble differential unit from housing</p> <p>4.3.10 Take out bearing cone from differential by hydraulic press</p> <p>4.3.11 Apply method of disassemble gear from spider gear</p> <p>4.3.12 Follow procedure of disassemble case from bevel gear</p> <p>4.3.13 Patient when working at tight area</p> |
|  |  | <p>4.4. Check Differential Components</p>   | <p>4.4.1 Types of differential components defect</p> <p>4.4.2 Inspecting gear back lash method</p> <p>4.4.3 Adjust pinion free load technique</p> <p>4.4.4 Visualize check parts and components from crack and wear</p> <p>4.4.5 Determine types of differential components defect</p> <p>4.4.6 Visual check parts and components from crack and wear.</p> <p>4.4.7 Inspect gear back lash</p> <p>4.4.8 Adjust pinion free load</p> <p>4.4.9 Conscientious when measure wear parts</p>  |

|  |  |  |   |
|--|--|--|---|
|  |  | <p>4.5. Assemble Differential Components</p> | <p>4.5.1 Function of hydraulic press</p> <p>4.5.2 Differential unit parts and components</p> <p>4.5.3 Apply procedure of assembling differential components</p> <p>4.5.4 Method of reassemble bevel gear to case</p> <p>4.5.5 Method of reassemble spider gear to gear</p> <p>4.5.6 Reinstall pinion shaft by pushing with hydraulic press</p> <p>4.5.7 Reassemble bevel gear to case</p> <p>4.5.8 Reassemble spider gear to gear</p> <p>4.5.9 Press bearing cone to differential</p> <p>4.5.10 Apply assembling differential components procedure</p>  |
|  |  | <p>4.6. Install Differential Assembly</p>    | <p>4.6.1 Function of differential unit</p> <p>4.6.2 Function of differential oil</p> <p>4.6.3 Technique of pressing in wheel shaft from centre housing</p> <p>4.6.4 Procedure of installing differential assembly</p> <p>4.6.5 Connecting propeller shaft and differential assembly</p> <p>4.6.6 Topping up differential oil</p> <p>4.6.7 Determine function of differential unit</p> <p>4.6.8 Press in wheel shaft from centre housing</p> <p>4.6.9 Apply procedure of installing differential assembly</p> <p>4.6.10 Connect propeller shaft and differential assembly</p> <p>4.6.11 Fix external components to differential assembly</p> <p>4.6.12 Top up differential oil</p> <p>4.6.13 Lift and handle all heavy components using lifting equipment of adequate capacity</p> |

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|  |  | <p>4.7. Test Differential Assembly Operations</p> | <p>4.7.1 Procedure Engine starting<br/> 4.7.2 Procedure Leakage inspect<br/> 4.7.3 Method of differential assembly testing<br/> 4.7.4 Updating log book<br/> 4.7.5 Apply procedure of engine starting<br/> 4.7.6 Inspect engine leakage<br/> 4.7.7 Apply testing differential performance method<br/> 4.7.8 Update log book<br/> 4.7.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br/> 4.7.10 Tidy up working area</p> |
|--|--|---|---|

**COMPETENCY 5: Overhaul final drive unit**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 5. Overhaul final drive unit    |     | 5.1. Obtain Final Drive Service Manual       | 5.1.1 Source of final drive service manual<br>5.1.2 Procedure of acquiring final drive service manual<br>5.1.3 Final drive service manual<br>5.1.4 Determine source of final drive service manual<br>5.1.5 Acquire final drive service manual<br>5.1.6 Interpret final drive service manual<br>5.1.7 Carefully read and observe precaution warnings given by manual            |
|                                 |     | 5.2. Remove Final Drive Assembly             | 5.2.1 Operation of final drive<br>5.2.2 Function of final drive<br>5.2.3 Procedure of removing final drive assembly<br>5.2.4 Draining lubrication oil<br>5.2.5 Determine operation of final drive<br>5.2.6 Determine function of final drive<br>5.2.7 Apply removing final drive assembly procedure<br>5.2.8 Drain lubrication oil<br>5.2.9 Patient when working at tight area |
|                                 |     | 5.3. Dismantle Final Drive Components        | 5.3.1 Operation of planetary gear<br>5.3.2 Function of planetary gear<br>5.3.3 Procedure of dismantling gear bearing and thrust washers<br>5.3.4 Disassemble final drive cover<br>5.3.5 Disassemble final drive planetary gear<br>5.3.6 Uninstall gear bearing and thrust washers  |

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|  |  | 5.4. Check Final Drive Parts And Components | 5.4.1 Types of final drive defects<br>5.4.2 Checking components for serviceability method<br>5.4.3 Checking components from crack and wear.<br>5.4.4 Determine types of final drives defects<br>5.4.5 Inspect components for serviceability<br>5.4.6 Inspect components from crack and wear.<br>5.4.7 Conscientious when measure wear parts                           |
|  |  | 5.5. Assemble Final Drive Components        | 5.5.1 Determine function of final drive components<br>5.5.2 Reassembling final drive planetary gear method<br>5.5.3 Procedure of assembling final drive components<br>5.5.4 Reassemble gear bearing and thrust washers<br>5.5.5 Reassemble final drive planetary gear<br>5.5.6 Reinstall final drive cover<br>5.5.7 Apply assembling final drive components procedure |
|  |  | 5.6. Install Final Drive Assembly           | 5.6.1 Operation of final drive<br>5.6.2 Function ability of final drive<br>5.6.3 Procedure of installing final drive assembly<br>5.6.4 Types of lubrication oil<br>5.6.5 Determine operation of final drive<br>5.6.6 Determine function ability of final drive<br>5.6.7 Apply installing final drive assembly procedure<br>5.6.8 Top up lubrication oil               |

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|  |  | <p>5.7. Test Final Drive Operations</p> | <p>5.7.1 Engine starting procedure</p> <p>5.7.2 Leakage inspect procedure</p> <p>5.7.3 Final drive testing procedure</p> <p>5.7.4 Updating log book</p> <p>5.7.5 Apply engine starting procedure</p> <p>5.7.6 Inspect engine leakage</p> <p>5.7.7 Apply final drive testing procedure</p> <p>5.7.8 Update log book</p> <p>5.7.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>5.7.10 Tidy up working area</p> |
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**COMPETENCY : 6** Overhaul planetary gear system

| CONTENT STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition     | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|-----------------------------------|-----|--|---|
| 6. Overhaul planetary gear system |     | 6.1. Obtain Planetary Gear System Service Manual | 6.1.1 Sources of planetary gear system service manual<br>6.1.2 Procedure of acquiring planetary gear system service manual<br>6.1.3 Planetary gear system service manual<br>6.1.4 Determine source of planetary gear system service manual<br>6.1.5 Acquire planetary gear system service manual<br>6.1.6 Interpret planetary gear system service manual<br>6.1.7 Carefully read and observe precaution warnings given by manual    |
|                                   |     | 6.2. Remove Planetary Gear System                | 6.2.1 Operation of planetary gear system<br>6.2.2 Types of gear<br>6.2.3 Function of planetary gear<br>6.2.4 Method of removing planetary gear system<br>6.2.5 Determine operation of planetary gear system<br>6.2.6 Determine types of gear<br>6.2.7 Determine function of planetary gear<br>6.2.8 Apply removing planetary gear system<br>6.2.9 Lift and handle all heavy components using lifting equipment of adequate capacity |
|                                   |     | 6.3. Dismantle Planetary Gear Assembly           | 6.3.1 Types of gear<br>6.3.2 Method of dismantling planetary gear assembly<br>6.3.3 Determine types of gear<br>6.3.4 Disassemble planetary gear assembly  |

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|  |  | 6.4. Check Planetary Gear Components  | 6.4.1 Types of planetary gear components defect<br>6.4.2 Checking planetary gear parts and components procedure<br>6.4.3 Measuring teeth contact<br>6.4.4 Determine types of planetary gear defect<br>6.4.5 Inspect planetary gear component defect<br>6.4.6 Measure teeth contact<br>6.4.7 Conscientious when measure teeth contact   |
|  |  | 6.5. Assemble Planetary Gear Assembly | 6.5.1 Function of gear<br>6.5.2 Procedure of assembling planetary gear assembly<br>6.5.3 Determine function of gear<br>6.5.4 Apply reassemble planetary gear assembly procedure<br>6.5.5 Conscientious when measure teeth contact  |
|  |  | 6.6. Install Planetary Gear System    | 6.6.1 Operation of planetary gear system<br>6.6.2 Types of gear<br>6.6.3 Function of planetary gear<br>6.6.4 Procedure of installing planetary gear system<br>6.6.5 Trying function ability of gear box<br>6.6.6 Connecting external attachments<br>6.6.7 Determine operation of planetary gear system<br>6.6.8 Determine types of gear<br>6.6.9 Determine function of planetary gear<br>6.6.10 Apply procedure of installing planetary gear system<br>6.6.11 Connect external attachments<br>6.6.12 Try function ability of gear box<br>6.6.13 Avoid splash gear box oil to skin, floor and eyes<br>6.6.14 Tidy up gear box oil |

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|  |  | <p><b>6.7. Test Planetary Gear Operations</b></p> | <p>6.7.1 Engine starting procedure</p> <p>6.7.2 Leakage inspect procedure</p> <p>6.7.3 Planetary gear system testing procedure</p> <p>6.7.4 Trying all level of gear</p> <p>6.7.5 Updating log book</p> <p>6.7.6 Apply engine starting procedure</p> <p>6.7.7 Inspect planetary gear system leakage</p> <p>6.7.8 Apply planetary gear system testing procedure</p> <p>6.7.9 Try all level of gear</p> <p>6.7.10 Update log book</p> <p>6.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>6.7.12 Keep work areas clean, uncluttered and free of spills</p> <p>6.7.13 Tidy up working area</p> |
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**COMPETENCY 7: Overhaul torque converter**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 7. Overhaul torque converter    |     | 7.1. Obtain Torque Converter Service Manual  | 7.1.1 Sources of torque converter service manual<br>7.1.2 Procedure of acquiring torque converter service manual<br>7.1.3 Torque converter service manual<br>7.1.4 Determine source of torque converter service manual<br>7.1.5 Acquire torque converter service manual<br>7.1.6 Interpret torque converter service manual<br>7.1.7 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 7.2. Remove Torque Converter Assembly        | 7.2.1 Principal of torque converter<br>7.2.2 Types of universal coupling<br>7.2.3 Procedure of removing torque converter assembly<br>7.2.4 Using lifter to move out torque converter<br>7.2.5 Disconnect external attachments<br>7.2.6 Uninstall universal coupling<br>7.2.7 Unscrew torque converter mounting bolts<br>7.2.8 Use lifter to move out torque converter<br>7.2.9 Lift and handle all heavy components using lifting equipment of adequate capacity |

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|  |  | <p>7.3. Dismantle Torque Converter Components</p> | <p>7.3.1 Torque converter parts and components</p> <p>7.3.2 Procedure of dismantling torque converter components</p> <p>7.3.3 Disassemble torque converter parts and components such as</p> <ul style="list-style-type: none"> <li>• Impeller</li> <li>• Turbine</li> <li>• Stator</li> <li>• Bearing</li> </ul> <p>7.3.4 Apply procedure of dismantling torque converter components</p>   |
|  |  | <p>7.4. Check Torque Converter Components</p>     | <p>7.4.1 Types of torque converter components default</p> <p>7.4.2 Checking for reusability of torque converter components</p> <p>7.4.3 Measuring running clearance</p> <p>7.4.4 Apply technique of checking bearing condition</p> <p>7.4.5 Types of torque converter components default</p> <p>7.4.6 Inspect reusability of torque converter components</p> <p>7.4.7 Measure running clearance between:</p> <p>7.4.8 Impeller and turbine</p> <p>7.4.9 Stator and impeller</p> <p>7.4.10 Apply technique of checking bearing condition</p> <p>7.4.11 Do not use petrol, paraffin or other solvent to remove oil from skin</p> <p>7.4.12 Conscientious when measure wear parts</p> |
|  |  | <p>7.5. Assemble Torque Converter Components</p>  | <p>7.5.1 Torque converter parts and components</p> <p>7.5.2 Procedure of reassembling torque converter components</p> <p>7.5.3 Reassemble torque converter parts and components</p> <p>7.5.4 Apply procedure of reassembling torque converter components</p> <p>7.5.5 Do not use petrol, paraffin or other solvent to remove oil from skin</p> <p>7.5.6 Conscientious when measure wear parts</p>  |

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|  |  | 7.6. Install Torque Converter Assembly | <p>7.6.1 Operation of torque converter</p> <p>7.6.2 Function ability of torque converter</p> <p>7.6.3 Procedure of installing torque converter components</p> <p>7.6.4 Connecting external attachments</p> <p>7.6.5 Topping up torque converter oil</p> <p>7.6.6 Trying function ability of torque converter</p> <p>7.6.7 Determine operation of torque converter</p> <p>7.6.8 Determine function ability of torque converter</p> <p>7.6.9 Apply installing torque converter components procedure</p> <p>7.6.10 Connect external attachments</p> <p>7.6.11 Top up torque converter oil</p> <p>7.6.12 Try function ability of torque converter</p> <p>7.6.13 Avoid splash torque converter oil to skin, floor and eyes</p> |
|  |  | 7.7. Test Torque Converter Performance | <p>7.7.1 Procedure of engine starting</p> <p>7.7.2 Procedure of leakage inspect</p> <p>7.7.3 Procedure of torque converter testing</p> <p>7.7.4 Trying all level of gear</p> <p>7.7.5 Updating log book</p> <p>7.7.6 Apply engine starting procedure</p> <p>7.7.7 Inspect planetary gear system leakage</p> <p>7.7.8 Apply torque converter testing procedure</p> <p>7.7.9 Try all level of gear</p> <p>7.7.10 Update log book</p> <p>7.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>7.7.12 Keep work areas clean, uncluttered and free of spills</p> <p>7.7.13 Tidy up working area</p>   |

**COMPETENCY 8: Overhaul power shift transmission**

| CONTENT STANDARD<br>performance      | Hrs | LEARNING STANDARD<br>performance , condition        | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|--------------------------------------|-----|---|--|
| 8. Overhaul power shift transmission |     | 8.1. Obtain Power Shift Transmission Service Manual | 8.1.1 Sources of power shift transmission service manual<br>8.1.2 Procedure of acquiring power shift transmission service manual<br>8.1.3 Power shift transmission service manual<br>8.1.4 Determine source of power shift transmission service manual<br>8.1.5 Acquire power shift transmission service manual<br>8.1.6 Interpret power shift transmission service manual<br>8.1.7 Carefully read and observe precaution warnings given by manual   |
|                                      |     | 8.2. Remove Power Shift Transmission Assembly       | 8.2.1 Types of transmission oil<br>8.2.2 Operation of power shift transmission<br>8.2.3 Procedure of removing power shift transmission<br>8.2.4 Taking out power shift transmission unit<br>8.2.5 Apply procedure of removing power shift transmission<br>8.2.6 Drain transmission oil<br>8.2.7 Disconnect external attachment<br>8.2.8 Loosen power shift mounting bolts<br>8.2.9 Take out power shift transmission unit<br>8.2.10 Apply procedure of removing power shift transmission<br>8.2.11 Lift and handle all heavy components using lifting equipment of adequate capacity |

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|  |  | <p><b>8.3. Dismantle Power Shift Transmission Components</b></p> | <p>8.3.1 Function of power shift transmission components</p> <p>8.3.2 Operation of power shift transmission components</p> <p>8.3.3 Procedure of dismantling power shift transmission component</p> <p>8.3.4 Uninstall power shift transmission hydraulic control valve</p> <p>8.3.5 Take out torque converter assembly</p> <p>8.3.6 Disassemble power shift transmission component such as</p> <ul style="list-style-type: none"> <li>• Clutch packs assembly</li> <li>• Planetary gear sets</li> <li>• Speed gear sets</li> <li>• Bearing and seal</li> </ul> <p>8.3.7 Do not use petrol, paraffin or other solvent to remove oil from skin</p> <p>8.3.8 Conscientious when measure wear parts</p> |
|  |  | <p><b>8.4. Check Power Shift Transmission Components</b></p>     | <p>8.4.1 Types of power shift transmission components defects</p> <p>8.4.2 Method of checking components from crack, broken and worn-out</p> <p>8.4.3 Measuring and adjusting end-play, pre-load and backlash</p> <p>8.4.4 Changing defect parts</p> <p>8.4.5 Determine types of power shift transmission components defects</p> <p>8.4.6 Inspect components from crack, broken and worn-out</p> <p>8.4.7 Measure end-play, pre-load and backlash and do necessary adjustment</p> <p>8.4.8 Change defect parts</p> <p>8.4.9 Do not use petrol, paraffin or other solvent to remove oil from skin</p> <p>8.4.10 Conscientious when measure wear parts</p>   |



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|  |  | <p>8.5. Assemble Power Shift Transmission Components</p> | <p>8.5.1 Operation of power shift transmission components</p> <p>8.5.2 Function ability of power shift transmission components</p> <p>8.5.3 Procedure of reassembling power shift transmission component</p> <p>8.5.4 Reassemble power shift transmission component such as</p> <ul style="list-style-type: none"> <li>• Clutch packs assembly</li> <li>• Planetary gear sets</li> <li>• Speed gear sets</li> <li>• Bearing and seal</li> </ul> <p>8.5.5 Reinstall power shift transmission hydraulic control valve</p> <p>8.5.6 Fix torque converter assembly</p>  |
|  |  | <p>8.6. Install Power Shift Transmission Assembly</p>    | <p>8.6.1 Function of transmission oil</p> <p>8.6.2 Function ability of power shift transmission</p> <p>8.6.3 Procedure of Installing power shift transmission</p> <p>8.6.4 Topping up transmission oil</p> <p>8.6.5 Procedure of installing power shift transmission</p> <p>8.6.6 Place power shift transmission unit to location</p> <p>8.6.7 Tighten power shift mounting bolts</p> <p>8.6.8 Connect external attachment</p> <p>8.6.9 Top up transmission oil</p> <p>8.6.10 Apply procedure of installing power shift transmission.</p> <p>8.6.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>8.6.12 Keep work areas clean, uncluttered and free of spills</p> |

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|  |  | <p>8.7. Test Power Shift Transmission Performance</p> | <p>8.7.1 Engine starting procedure</p> <p>8.7.2 Leakage inspect procedure</p> <p>8.7.3 Procedure of power shift transmission testing</p> <p>8.7.4 Update log book</p> <p>8.7.5 Trying all level of gear</p> <p>8.7.6 Apply engine starting procedure</p> <p>8.7.7 Inspect power shift transmission system leakage</p> <p>8.7.8 Apply power shift transmission testing procedure</p> <p>8.7.9 Try all level of gear</p> <p>8.7.10 Update log book</p> <p>8.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>8.7.12 Keep work areas clean, uncluttered and free of spills</p> <p>8.7.13 Tidy up working area</p> |
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**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **ELECTRICAL SYSTEM REPAIR**  
**MODULE CODE** : **CAAM 410**  
**LEVEL** : **2**  
**SEMESTER** : **4**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 5 hr/week (P)  
6 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Repair starter motor
- Repair alternator unit
- Overhaul turbocharger unit
- Repair implement safety clutch & gearbox assembly

## MODULE DESCRIPTION

This unit identifies the competence required to repair starter motor using hand tools set, starter motor service manual, growler, grease, sand paper, new carbon brush, soldering tools kits and log book so that starter motor service manual obtained starter motor assembly removed, starter motor components dismantled, starter motor components checked, starter motor components assembled, starter motor installed and maintenance check list recorded in accordance with manufacturer's specification

This unit identifies the competence required to repair alternator unit using hand tools set, alternator service manual, multimeter, ampere meter, voltmeter, soldering tools kits and log book so that alternator service manual obtain, alternator assembly removed, alternator components dismantled, alternator components checked, alternator component assembled, alternator assembly installed and alternator performance tested in accordance with manufacturer's specification

This unit identifies the competence required to overhaul Turbocharger unit using hand tools set, torque wrench, anti rush, turbo charger system service manual, wire brunch, vacuum meter and log book so that turbo charger system service manual obtained, turbo charger assembly removed, turbo charger components dismantled, turbo charger components checked, turbo charger components assembled, turbo charger assembly installed and turbo charger system tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair implement safety clutch & gearbox assembly using implement safety clutch & gear box service manual, hand tools set, manual, grease, spare parts and log book so that Remove implement safety clutch & gear box assembly Dismantle implement safety clutch & gear box components Execute repairing work Assemble implement safety clutch & gear box components Install implement safety clutch & gear box assembly Test Implement Safety Clutch & Gear Box operations tested in accordance with manufacturer's specification.

## CONTENT AND LEARNING STANDARD

**Programme : AGRICULTURAL MECHANIZATION**

**Module 10: ELECTRICAL SYSTEM REPAIR**

**COMPETENCY 1: Repair starter motor**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 1 Repair starter motor          |     | 1.1 Obtain Starter Motor Service Manual      | 1.1.1 Sources of starter motor service manual<br>1.1.2 Procedure of acquiring starter motor service manual<br>1.1.3 starter motor service manual<br>1.1.4 Determine source of starter motor service manual<br>1.1.5 Acquire starter motor service manual<br>1.1.6 Interpret starter motor service manual<br>1.1.7 Interpret starter motor circuit<br>1.1.8 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 1.2 Remove Starter Motor                     | 6.3.1 Types of starter motor<br>6.3.2 Function of starter motor<br>6.3.3 Types of battery terminal<br>6.3.4 Procedure of removing starter motor<br>6.3.5 Determine types of starter motor<br>6.3.6 Determine function of starter motor<br>6.3.7 Disconnect negative battery terminal<br>6.3.8 Disconnect external attachment<br>6.3.9 Uninstall starter motor from machine<br>6.3.10 Apply removing starter motor procedure<br>6.3.11 Do not wear rings, wristwatches, jewels and unbuttoned clothing |

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|  |  | 1.3 Dismantle Starter Motor Components | 6.3.1 Construction of starter motor<br>6.3.2 Starter motor parts and components<br>6.3.3 Procedure of dismantling starter motor<br>6.3.4 Determine construction of starter motor<br>6.3.5 Disassemble starter motor parts and components such as <ul style="list-style-type: none"> <li>• Carbon brush</li> <li>• Armature</li> <li>• Solenoid</li> <li>• Bearing</li> <li>• Field coil</li> <li>• Pinion gear</li> </ul> 6.3.6 Apply dismantling starter motor procedure<br>6.3.7 Meticulous when using soldering iron |
|  |  | 1.4 Check Starter Motor Components     | 6.4.1 Types of starter motor components defects<br>6.4.2 Inspection of starter motor defects procedure<br>6.4.3 Determine types of starter motor defects<br>6.4.4 Inspect starter motor defects<br>6.4.5 Inspect continuity of armature and solenoid<br>6.4.6 Apply checking starter motor defect procedure<br>6.4.7 Handle electrical testing equipment with care  |
|  |  | 1.5 Assemble Starter Motor Components  | 6.5.1 Operation of starter motor<br>6.5.2 Starter motor parts and components<br>6.5.3 Soldering equipment<br>6.5.4 Procedure of assembling starter motor<br>6.5.5 Determine operation of starter motor<br>6.5.6 Determine reassemble starter motor parts and components<br>6.5.7 Solder carbon brush to location<br>6.5.8 Apply <b>reassembling</b> starter motor procedure<br>6.5.9 Meticulous when using soldering iron   |

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|  |  | 1.6 Install Starter Motor         | 6.6.1 Types of starter motor<br>6.6.2 Function of starter motor<br>6.6.3 Types of battery terminal<br>6.6.4 Procedure of installing starter motor<br>6.6.5 Determine types of starter motor<br>6.6.6 Determine function of starter motor<br>6.6.7 Reinstall starter motor from machine<br>6.6.8 Connect external attachment<br>6.6.9 Connect negative battery terminal<br>6.6.10 Crank starter motor for testing<br>6.6.11 Always test starter motor functionality before install it to engine  |
|  |  | 1.7 Test Starter Motor Operations | 6.7.1 Engine starting procedure<br>6.7.2 Testing starter motor operation method<br>6.7.3 Inspect starter motor performance such as <ul style="list-style-type: none"> <li>Abnormal noise</li> <li>Cranking ability</li> </ul> 6.7.4 Updating log book<br>6.7.5 Apply engine starting procedure<br>6.7.6 Start engine system<br>6.7.7 Apply testing starter motor operations method<br>6.7.8 Inspect starter motor performance such as <ul style="list-style-type: none"> <li>Abnormal noise</li> <li>Cranking ability</li> </ul> 6.7.9 Update log book<br>6.7.10 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>6.7.11 Tidy up working area |

**COMPETENCY : 2** Repair alternator unit

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|--|--|
| 2 Repair alternator unit           |     | 2.1 Obtain Alternator Service Manual         | 2.1.1 Sources of alternator unit service manual<br>2.1.2 Procedure of acquiring alternator unit service manual<br>2.1.3 Alternator unit service manual<br>2.1.4 Determine source of alternator unit service manual<br>2.1.5 Acquire alternator unit service manual<br>2.1.6 Interpret alternator unit service manual<br>2.1.7 Interpret alternator unit circuit<br>2.1.8 Carefully read and observe precaution warnings given by manual  |
|                                    |     | 2.2 Remove Alternator Assembly               | 2.2.1 Types of alternator unit<br>2.2.2 Function of alternator unit<br>2.2.3 Types of alternator belt<br>2.2.4 Procedure of removing alternator unit<br>2.2.5 Determine types of alternator unit<br>2.2.6 Determine function of alternator unit<br>2.2.7 Disconnect negative battery terminal<br>2.2.8 Uninstall alternator belt<br>2.2.9 Uninstall alternator unit from machine<br>2.2.10 Follow procedure removing alternator unit<br>2.2.11 Do not wear rings, wristwatches, jewels and unbuttoned clothing |



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|  |  | 2.3 Dismantle Alternator Components | <p>2.3.1 Construction of alternator unit</p> <p>2.3.2 Alternator unit parts and components</p> <p>2.3.3 Procedure of dismantling alternator unit</p> <p>2.3.4 Determine construction of alternator unit</p> <p>2.3.5 Disassemble alternator unit parts and components such as</p> <ul style="list-style-type: none"> <li>• Carbon brush</li> <li>• Rectifier</li> <li>• Rotor</li> <li>• Stator coil</li> <li>• Bearing</li> <li>• Housing</li> </ul> <p>2.3.6 Apply procedure of dismantling alternator unit</p> <p>2.3.7 Apply procedure of dismantling alternator unit</p> |
|  |  | 2.4 Check Alternator Components     | <p>2.4.1 Types of alternator components defects</p> <p>2.4.2 Inspection of alternator components defects procedure</p> <p>2.4.3 Determine types of alternator components defects</p> <p>2.4.4 Inspect alternator components defects</p> <p>2.4.5 Inspect continuity of rotor and stator coil</p> <p>2.4.6 Apply checking starter motor defect procedure</p> <p>2.4.7 Handle electrical testing equipment with care</p>  |
|  |  | 2.5 Assemble Alternator Component   | <p>2.5.1 Operation of alternator unit</p> <p>2.5.2 Alternator parts and components</p> <p>2.5.3 Soldering equipment</p> <p>2.5.4 Procedure of assembling alternator components procedure</p> <p>2.5.5 Determine operation of alternator unit</p> <p>2.5.6 Determine reassemble alternator parts and components</p> <p>2.5.7 Solder carbon brush to location</p> <p>2.5.8 Apply reassembling alternator component procedure</p> <p>2.5.9 Meticulous when assembling alternator parts and components</p>  |

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|  |  | 2.6 Install Alternator Assembly | 2.6.1 Types of alternator unit<br>2.6.2 Function of alternator unit<br>2.6.3 Types of alternator belt<br>2.6.4 Procedure of installing alternator assembly<br>2.6.5 Determine types of alternator unit<br>2.6.6 Determine function of alternator unit<br>2.6.7 Reinstall alternator unit from machine<br>2.6.8 Reinstall alternator belt<br>2.6.9 Connect negative battery terminal<br>2.6.10 Meticulous when installing alternator belt  |
|  |  | 2.7 Test Alternator Performance | 2.7.1 Engine starting procedure<br>2.7.2 Testing alternator performance method<br>2.7.3 Engine idling Revolution Per Minute(RPM)<br>2.7.4 Updating log book<br>2.7.5 Apply engine starting procedure<br>2.7.6 Apply testing alternator performance method<br>2.7.7 Measure output voltage and current of alternator<br>2.7.8 Tune engine idling Revolution Per Minute(RPM)<br>2.7.9 Update log book<br>2.7.10 Never bring head, body, arm, leg and fingers near fans or rotating belts<br>2.7.11 Meticulous when recording maintenance check sheet<br>2.7.12 Keep work areas clean, uncluttered and free of spills<br>2.7.13 Tidy up working area |

**COMPETENCY : 3** Overhaul turbocharger unit

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition   | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|--|--|
| 3 Overhaul turbocharger unit       |     | 3.1 Obtain turbo charger system service manual | 3.1.1 Source of turbo charger system service manual<br>3.1.2 Procedures of acquiring turbo charger system service manual<br>3.1.3 Turbo charger system service manual<br>3.1.4 Determine source of turbo charger system service manual<br>3.1.5 Acquire turbo charger system service manual<br>3.1.6 Interpret turbo charger system service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|                                    |     | 3.2 Remove turbo charger assembly              | 3.2.1 Operation of turbo charger system<br>3.2.2 Function of turbo charger<br>3.2.3 Procedures of removing turbo Charger Assembly<br>3.2.4 Uninstall external attachments<br>3.2.5 Uninstall turbo charger unit<br>3.2.6 Determine operation of turbo charger system<br>3.2.7 Determine function of turbo charger<br>3.2.8 Determine Uninstall external attachments<br>3.2.9 Determine Uninstall turbo charger unit<br>3.2.10 Apply procedure of removing turbo charger assembly<br>3.2.11 Meticulous when working with hot components |

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|  |  | <p>3.3 Dismantle turbo charger components</p> | <p>3.3.1 Name of turbo charger components such as</p> <ul style="list-style-type: none"> <li>• Housing</li> <li>• Impeller</li> <li>• Shaft</li> <li>• Turbine</li> </ul> <p>3.3.2 Function of turbo charger components</p> <p>3.3.3 Procedures of dismantling turbo charger components</p> <p>3.3.4 Determine function of turbo charger components</p> <p>3.3.5 Separate turbo charger parts and components</p> <p>3.3.6 Apply procedure of dismantling turbo charger components</p> <p>3.3.7 Never use tools or equipment for any purpose other than that for which they were designed</p>   |
|  |  | <p>3.4 Check turbo charger components</p>     | <p>3.4.1 Type of turbo charger components defect</p> <p>3.4.2 Types of measuring equipments</p> <p>3.4.3 Procedures of checking turbo charger components</p> <p>3.4.4 Checking turbo charger components from defect</p> <p>3.4.5 Determine type of turbo charger components defect</p> <p>3.4.6 Choose types of measuring equipments</p> <p>3.4.7 Inspect turbo charger components from defect such as</p> <ul style="list-style-type: none"> <li>• Radial play</li> <li>• Axial play</li> <li>• Rotor shaft end play</li> </ul> <p>3.4.8 Apply checking turbo charger components procedure</p> <p>3.4.9 Conscientious when measure wear parts</p> |

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|  |  | <p>3.5 Assemble turbo charger components</p> | <p>3.5.1 Function of turbo charger components<br/> 3.5.2 Procedures of assembling turbo charger components<br/> 3.5.3 Techniques of reassemble turbo charger parts and components<br/> 3.5.4 Determine function of turbo charger components<br/> 3.5.5 Follow techniques of reassemble turbo charger parts and components<br/> 3.5.6 Apply procedure of assembling turbo charger components<br/> 3.5.7 Adhere to safety and health procedure</p>   |
|  |  | <p>3.6 Install turbo charger assembly</p>    | <p>3.6.1 Operation of turbo charger system<br/> 3.6.2 Function of turbo charger<br/> 3.6.3 Procedures of installing turbo charger assembly<br/> 3.6.4 Method of reinstall turbo charger unit<br/> 3.6.5 Method of reinstall external attachments<br/> 3.6.6 Determine operation of turbo charger system<br/> 3.6.7 Determine function of turbo charger<br/> 3.6.8 Apply method of reinstall turbo charger unit<br/> 3.6.9 Apply method of reinstall external attachments<br/> 3.6.10 Follow procedure of installing turbo charger assembly<br/> 3.6.11 Careful when placing gasket</p> |

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|  |  | <p>3.7 Test turbo charger system</p> | <p>3.7.1 Engine starting procedure</p> <p>3.7.2 Using vacuum meter</p> <p>3.7.3 Method of testing turbo charger system</p> <p>3.7.4 Engine working temperature</p> <p>3.7.5 Updating log book</p> <p>3.7.6 Apply engine starting procedure</p> <p>3.7.7 Use vacuum meter</p> <p>3.7.8 Apply testing turbo charger system method</p> <p>3.7.9 Inspect turbo charger system such as</p> <ul style="list-style-type: none"> <li>• Abnormal sound</li> <li>• Leakage</li> <li>• Smoke</li> <li>• Blockage</li> </ul> <p>3.7.10 Update log book</p> <p>3.7.11 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>3.7.12 Tidy up working area</p> |
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**COMPETENCY 4: Repair Implement Safety Clutch & Gearbox Assembly**

| <b>CONTENT<br/>STANDARD<br/>performance</b>         | <b>Hrs</b> | <b>LEARNING STANDARD<br/>performance , condition</b>         | <b>PERFORMANCE CRITERIA<br/>performance,condition, standard</b>  |
|---|------------|--|--|
| 4 Repair Implement Safety Clutch & Gearbox Assembly |            | 4.1 Obtain implement safety clutch & gear box service manual | 4.1.1 Read carefully safety clutch and gearbox manual  |
|   |            | 4.2 Remove implement safety clutch & gear box assembly       | 4.2.1 Remove the clutch guard from clutch assembly<br>4.2.2 Remove the adjusting nut washer and spring   |
|   |            | 4.3 Dismantle implement safety clutch & gear box components  | 4.3.1 Remove the sleeve from clutch assembly<br>4.3.2 Dismantle the clutch disc and pressure plate   |
|   |            | 4.4 Execute repairing work                                   | 4.4.1 Check any defect of clutch disc<br>4.4.2 Clean pressure plate and clutch disc  |
|   |            | 4.5 Assemble implement safety clutch & gear box components   | 4.5.1 Assemble new clutch disc and pressure plate<br>4.5.2 Fit the sleeve  |
|   |            | 4.6 Install implement safety clutch & gear box assembly      | 4.6.1 Fit the spring, washer and nut   |
|   |            | 4.7 Test Implement Safety Clutch & Gear Box operations       | 4.7.1 Test safety clutch operation refer to manual<br>4.7.2 Adjust the correct operational at safety clutch by tighten the adjustable nut.<br>4.7.3 Install the clutch guard |

**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE : COMBINE HARVESTER REPAIR**

**MODULE CODE : CAAM 411**

**LEVEL : 2**

**SEMESTER : 4**

**CREDIT UNIT : 2.0**

**CONTACT HOUR : 1 hr/week (T) 2 hr/week (P)**  
**3 hr/week (Total)**

**MODULE STATUS : VOCATIONAL**

**PREREQUISITE : -**



## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Carry out track sprocket bearings adjustment
- Service track rollers
- Carry out track alignment
- Repair auger unit
- Repair conveyor system
- Repair elevator system
- Troubleshoot faulty transporting devices

## MODULE DESCRIPTION

This unit identifies the competence required to carry out track sprocket bearing adjustment using hand tools set, torque multiplier, extension pipe, special tools, adjusting sprocket bearing service manual and log book so that adjusting sprocket bearing service manual obtained, sprocket bearing adjusted and sprocket bearing operations tested in accordance with manufacturer's specification

This unit identifies the competence required to service track rollers using hand tools set, torque wrench, identify track rollers service manual, grease and log book so that track rollers service manual obtained, track rollers removed, track rollers servicing works executed, track rollers installed and track rollers operation tested in accordance with manufacturer's specification.

This unit identifies the competence required to carry out track alignment using hand tools set, measuring equipment, shims, string, track alignment service manual and log book so that track alignment service manual obtained, track assembly removed, track aligned, track assembly installed and track alignment tested in accordance with manufacturer's specification.

This unit identifies the competence required to service auger unit using hand tools set, auger service manual, grease, lubrication oil and service checklist form so that auger service manual obtained, auger servicing works executed and service checklist recorded in accordance with manufacturer's specification.

This unit identifies the competence required to repair conveyor unit using hand tools set, conveyor service manual, grease, lubrication oil, spare parts, log book and lifting equipment so that conveyor service manual obtained, conveyor assembly removed, conveyor condition checked, repairing work executed, conveyor assembly installed and conveyor operations tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair elevator unit using hand tools set, elevator service manual, grease, lubrication oil, spare parts, log book and lifting equipment so that elevator service manual obtained, elevator assembly removed, elevator condition checked, elevator repairing work executed, elevator assembly installed and elevator operation tested in accordance with manufacturer's specification

This unit identifies the competence required to Troubleshoot transporting devices faulty using customer complaint form, diagnose tools and equipment, hand tools set, new spare parts and checklist so that customer complaint form obtained, transporting devices service manual obtained, troubleshooting works executed and service checklist recorded in accordance with standard operating procedure.

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## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 11: COMBINE HARVESTER REPAIR

#### COMPETENCY 1: Carry out track sprocket bearings adjustment

| CONTENT STANDARD<br>performance                | Hrs | LEARNING STANDARD<br>performance , condition         | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|--|---|
| 1 Carry out track sprocket bearings adjustment |     | 1.1 Obtain Adjusting Sprocket Bearing Service Manual | 1.1.1 Identify Source of adjusting track service manual<br>1.1.2 Explain Procedure of acquiring adjusting track service manual<br>1.1.3 Adjusting track service manual<br>1.1.4 Determine source of adjusting track service manual<br>1.1.5 Acquire adjusting track service manual<br>1.1.6 Interpret adjusting track service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual  |
|  |     | 1.2 Adjust Sprocket Bearing                          | 1.2.1 Identify Types of sprocket bearing<br>1.2.2 Describe Function of adjusting sprocket bearing<br>1.2.3 Explain Sprocket bearing adjustment procedure<br>1.2.4 Uninstall final drive hub lock<br>1.2.5 Move out cap and lock<br>1.2.6 Loosen adjustment nut<br>1.2.7 Add shim for adjust sprocket bearing to specification<br>1.2.8 Measure pre-load according to specification<br>1.2.9 Tighten adjustment nut<br>1.2.10 Fix cap, lock and final drive hub lock<br>1.2.11 Adhere to safety and health procedure |

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|  |  | <p><b>1.3 Test Sprocket Bearing Operations</b></p> <p>1.3.1 Demonstrate Engine starting procedure</p> <p>1.3.2 Describe Method of testing sprocket bearing operations</p> <p>1.3.3 Update log book</p> <p>1.3.4 Apply engine starting procedure</p> <p>1.3.5 Apply testing sprocket bearing operations method</p> <p>1.3.6 Inspect sprocket bearing condition</p> <p>1.3.7 Try sprocket bearing operations</p> <p>1.3.8 Update log book</p> <p>1.3.9 Never run the engine in confined spaces which are not equipped with</p> <p>1.3.10 adequate ventilation for exhaust gas extraction</p> <p>1.3.11 Keep work areas clean, uncluttered and free of spills</p> <p>1.3.12 Tidy up working area</p> |
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**COMPETENCY 2: Service track rollers**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 2 Service track rollers            |     | 2.1 Obtain Track Rollers Service Manual      | 2.1.1 Identify Sources of adjusting track service manual<br>2.1.2 Explain Procedure of acquiring adjusting track service manual<br>2.1.3 Adjusting track service manual<br>2.1.4 Determine source of adjusting track service manual<br>2.1.5 Acquire adjusting track service manual<br>2.1.6 Interpret adjusting track service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual |
|                                    |     | 2.2 Remove Track Rollers                     | 2.2.1 Identify Types of track rollers<br>2.2.2 Describe Function of track rollers<br>2.2.3 Demonstrate Procedure of removing track rollers<br>2.2.4 Determine types of track rollers<br>2.2.5 Determine function of track rollers<br>2.2.6 Apply removing track rollers procedure<br>2.2.7 Lift and handle all heavy components using lifting equipment   |

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|--|--|---|--|
|  |  | 2.3 Execute Track Rollers Servicing Works | 2.3.1 Identify Types of track roller defects<br>2.3.2 Explain Servicing track roller procedure<br>2.3.3 Clean track rollers<br>2.3.4 Determine types of track roller defects<br>2.3.5 Inspect track rollers from wear and tear<br>2.3.6 Reseal and rebearing track rollers<br>2.3.7 Grease track rollers components<br>2.3.8 Apply servicing track roller procedure<br>2.3.9 Never use gasoline, diesel oil or other flammable liquids as cleaning agents<br>2.3.10 Careful when lubricants and greases, its may splitting to the eyes |
|  |  | 2.4 Install Track Rollers                 | 2.4.1 Explain Operation of track rollers<br>2.4.2 Describe Track rollers function ability<br>2.4.3 Demonstrate Procedure of installing track rollers<br>2.4.4 Determine operation of track rollers<br>2.4.5 Determine track rollers function ability<br>2.4.6 Apply installing track rollers procedure<br>2.4.7 Accuracy when setting torque wrench<br>2.4.8 Never use tools or equipment for any purpose other than that for which they were designed   |

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|--|--|---|--|
|  |  | <p>2.5 Test Track Rollers Operation</p> | <p>2.5.1 Demonstrate Engine starting procedure</p> <p>2.5.2 Describe Testing track rollers operations method</p> <p>2.5.3 Updating log book</p> <p>2.5.4 Apply engine starting procedure</p> <p>2.5.5 Apply testing track rollers operations method</p> <p>2.5.6 Inspect track rollers condition</p> <p>2.5.7 Try track rollers performance</p> <p>2.5.8 Update log book</p> <p>2.5.9 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>2.5.10 Keep work areas clean, uncluttered and free of spills</p> <p>2.5.11 Tidy up working area</p> |
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**COMPETENCY 3: Carry out track alignment**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|---------------------------------|-----|--|---|
| 3 Carry out track alignment     |     | 3.1 Obtain Track Alignment Service Manual    | 3.1.1 Identify Source of track alignment service manual<br>3.1.2 Describe Procedure of acquiring track alignment service manual<br>3.1.3 Use Track alignment service manual<br>3.1.4 Determine source of track alignment service manual<br>3.1.5 Acquire track alignment service manual<br>3.1.6 Interpret track alignment service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|                                 |     | 3.2 Remove Track Assembly                    | 3.2.1 List Type of track link<br>3.2.2 Explain Function of track link<br>3.2.3 Describe Operation of track link assembly<br>3.2.4 Demonstrate Procedure of removing track link assembly<br>3.2.5 Determine type of track link<br>3.2.6 Determine function of track link<br>3.2.7 Determine operation of track link assembly<br>3.2.8 Uninstall track link assembly from machine such as <ul style="list-style-type: none"> <li>• Top carrier rollers</li> <li>• Bottom rollers</li> <li>• Sprocket</li> <li>• Link</li> <li>• Track shoes</li> </ul> 3.2.9 Apply removing track link assembly procedure<br>3.2.10 Never use tools or equipment for any purpose other than that for which they were designed |



|  |  |                            |  |
|--|--|----------------------------|--|
|  |  | 3.3 Align Track            | 3.3.1 Demonstrate Track frame toe in/toe out<br>3.3.2 Measuring width at right to left of front and rear machine method<br>3.3.3 Measuring line position at sprocket and idler centre point method<br>3.3.4 Adjusting track alignment procedure<br>3.3.5 Inspect track frame toe in/toe out<br>3.3.6 Measure width at right to left of front machine<br>3.3.7 Measure width at right to left if rear machine<br>3.3.8 Compare result with machine service manual tolerance<br>3.3.9 Measure line position at sprocket and idler centre point<br>3.3.10 Add shims to adjust sprocket and idler centre point<br>3.3.11 Conscientious when measure line position at sprocket and idler centre point |
|  |  | 3.4 Install Track Assembly | 3.4.1 Describe Operation of track link assembly<br>3.4.2 Installing track shoes to track link assembly method<br>3.4.3 Demonstrate Method of Installing track link assembly to machine<br>3.4.4 Apply installing track link assembly procedure<br>3.4.5 Determine operation of track link assembly<br>3.4.6 Reinstall track shoes to track link assembly<br>3.4.7 Reinstall track link assembly to machine<br>3.4.8 Apply installing track link assembly procedure   |

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|--|--|---------------------------------|--|
|  |  | <p>3.5 Test Track Alignment</p> | <p>3.5.1 Demonstrate Engine starting procedure</p> <p>3.5.2 Explain Track link inspection procedure</p> <p>3.5.3 Apply Method of testing track alignment</p> <p>3.5.4 Updating log book</p> <p>3.5.5 Apply engine starting procedure</p> <p>3.5.6 Apply testing track alignment method</p> <p>3.5.7 Inspect track link condition</p> <p>3.5.8 Try track link performance</p> <p>3.5.9 Update log book</p> <p>3.5.10 Never run the engine in confined spaces which are not equipped with</p> <p>3.5.11 adequate ventilation for exhaust gas extraction</p> <p>3.5.12 Keep work areas clean, uncluttered and free of spills</p> <p>3.5.13 Tidy up working area</p> |
|--|--|---------------------------------|--|

**COMPETENCY 4: Repair auger unit**

| CONTENT STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---------------------------------|-----|--|--|
| 4 Repair auger unit             |     | 4.1 Obtain auger service manual              | 4.1.1 Discuss Source of auger unit service manual<br>4.1.2 Apply Procedure to acquire auger unit service manual<br>4.1.3 Acquire Auger unit service manual<br>4.1.4 Determine source of auger unit service manual<br>4.1.5 Acquire auger unit service manual<br>4.1.6 Interpret auger unit service manual<br>4.1.7 Carefully read and observe precaution warnings given by manual  |
|                                 |     | 4.2 Remove auger unit                        | 4.2.1 Classify Types of auger unit<br>4.2.2 Removing auger from machine<br>4.2.3 Determine types of auger unit<br>4.2.4 Disconnect external attachment<br>4.2.5 Uninstall auger from machine<br>4.2.6 Apply removing auger procedure<br>4.2.7 Do not wear rings, wristwatches, jewels and unbuttoned clothing  |
|                                 |     | 4.3 Check auger condition                    | 4.3.1 Classify Types of auger components defects<br>4.3.2 Measuring auger components technique<br>4.3.3 Determine types of auger components defects<br>4.3.4 Inspect auger components from defects<br>4.3.5 Measure auger components from wear and tear such as <ul style="list-style-type: none"> <li>• Auger table</li> <li>• Auger spiral</li> <li>• Auger retractable fingers</li> </ul> 4.3.6 Conscientious when measure wear parts |

|  |  |                            |   |
|--|--|----------------------------|---|
|  |  | 4.4 Execute repairing work | 4.4.1 Replacing auger parts procedure<br>4.4.2 Repairing auger parts and components method<br>4.4.3 Change auger table defect parts<br>4.4.4 Change auger spiral defect parts<br>4.4.5 Change retractable fingers defect parts<br>4.4.6 Apply repairing auger parts and components method<br>4.4.7 Meticulous when working with sharp components  |
|  |  | 4.5 Install auger unit     | 4.5.1 Classify Types of auger unit<br>4.5.2 Installing auger to machine procedure<br>4.5.3 Determine types of auger unit<br>4.5.4 Reinstall auger to machine<br>4.5.5 Connect external attachment<br>4.5.6 Apply installing auger procedure<br>4.5.7 Meticulous when installing auger to machine  |
|  |  | 4.6 Test auger operation   | 4.6.1 Operating auger unit<br>4.6.2 Testing auger operation method<br>4.6.3 Determine operating auger unit<br>4.6.4 Apply testing auger operation method<br>4.6.5 Inspect function ability of auger unit<br>4.6.6 Tidy up working area<br>4.6.7 Update log book<br>4.6.8 Meticulous when recording maintenance check sheet<br>4.6.9 Keep work areas clean, uncluttered and free of spills |

**COMPETENCY 5:** Repair conveyor system

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|--|---|
| 5 Repair conveyor system           |     | 5.1 Obtain conveyor service manual           | 5.1.1 Use Source of conveyor service manual<br>5.1.2 Manipulate Procedure to acquire conveyor service manual<br>5.1.3 Practice Conveyor service manual<br>5.1.4 Determine source of conveyor service manual<br>5.1.5 Acquire conveyor service manual<br>5.1.6 Interpret conveyor service manual<br>5.1.7 Careful when lubricants and greases, its may splitting to the eyes   |
|                                    |     | 5.2 Remove conveyor assembly                 | 5.2.1 Classify Types of conveyor system<br>5.2.2 Demonstrate Removing conveyor from machine<br>5.2.3 Determine types of conveyor unit<br>5.2.4 Disconnect external attachment<br>5.2.5 Uninstall conveyor from machine<br>5.2.6 Apply removing conveyor procedure<br>5.2.7 Meticulous when working with heavy components  |
|                                    |     | 5.3 Check conveyor condition                 | 5.3.1 Classify Types of conveyor components defects<br>5.3.2 Measuring conveyor components technique<br>5.3.3 Determine types of conveyor components defects<br>5.3.4 Inspect conveyor components from defects<br>5.3.5 Measure conveyor components from wear and tear such as <ul style="list-style-type: none"> <li>• Conveyor table</li> <li>• Paddle</li> <li>• Conveyor chain</li> <li>• Feeder beater (drum)</li> </ul> 5.3.6 Conscientious when measure wear parts |

|  |  |                               |  |
|--|--|-------------------------------|--|
|  |  | 5.4 Execute repairing work    | 5.4.1 Replacing conveyor parts procedure<br>5.4.2 Repairing conveyor parts and components method<br>5.4.3 Change conveyor table defect parts<br>5.4.4 Change paddle defect parts<br>5.4.5 Change conveyor chain defect parts<br>5.4.6 Change feeder beater defect parts<br>5.4.7 Apply repairing conveyor parts and components method<br>5.4.8 Meticulous when handling corrosive parts                      |
|  |  | 5.5 Install conveyor assembly | 5.5.1 Classify Types of conveyor unit<br>5.5.2 Installing conveyor to machine procedure<br>5.5.3 Determine types of conveyor unit<br>5.5.4 Reinstall conveyor to machine<br>5.5.5 Connect external attachment<br>5.5.6 Apply installing conveyor procedure<br>5.5.7 Meticulous when installing conveyor components   |
|  |  | 5.6 Test conveyor operations  | 5.6.1 Operating of conveyor system<br>5.6.2 Testing conveyor operation method<br>5.6.3 Determine operating of conveyor system<br>5.6.4 Apply testing conveyor operation method<br>5.6.5 Inspect conveyor unit functionality<br>5.6.6 Tidy up working area<br>5.6.7 Update log book<br>5.6.8 Meticulous when recording maintenance check sheet<br>5.6.9 Keep work areas clean, uncluttered and free of spills |

**COMPETENCY 6: Repair elevator system**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|--|--|
| 6 Repair elevator system           |     | 6.1 Obtain elevator service manual           | 6.1.1 Use Source of elevator service manual<br>6.1.2 Demonstrate Procedure to acquire elevator service manual<br>6.1.3 Utilize Elevator service manual<br>6.1.4 Determine source of elevator service manual<br>6.1.5 Acquire elevator service manual<br>6.1.6 Interpret elevator service manual<br>6.1.7 Careful when lubricants and greases, its may splitting to the eyes  |
|                                    |     | 6.2 Remove elevator assembly                 | 6.2.1 Classify Types of elevator system<br>6.2.2 Demonstrate Removing elevator from machine<br>6.2.3 Determine types of elevator unit<br>6.2.4 Disconnect external attachment<br>6.2.5 Uninstall elevator from machine<br>6.2.6 Apply removing elevator procedure<br>6.2.7 Meticulous when handling with heavy elevator components   |
|                                    |     | 6.3 Check elevator condition                 | 6.3.1 Distinguish Types of elevator components defects<br>6.3.2 Measuring elevator components technique<br>6.3.3 Determine types of elevator components defects<br>6.3.4 Inspect elevator components from defects<br>6.3.5 Measure elevator components from wear and tear such as <ul style="list-style-type: none"> <li>Elevator housing</li> <li>Elevator auger</li> <li>Elevator chute</li> </ul> 6.3.6 Conscientious when measure wear parts |

|  |  |                                     |  |
|--|--|-------------------------------------|--|
|  |  | 6.4 Execute elevator repairing work | 6.4.1 Replacing elevator parts procedure<br>6.4.2 Repairing elevator parts and components method<br>6.4.3 Change elevator housing defect parts<br>6.4.4 Change elevator auger defect parts<br>6.4.5 Change elevator chute defect parts<br>6.4.6 Apply repairing elevator parts and components method<br>6.4.7 Adhere to safety and health procedure  |
|  |  | 6.5 Install elevator assembly       | 6.5.1 Classify Types of elevator unit<br>6.5.2 Installing elevator to machine procedure<br>6.5.3 Determine types of elevator unit<br>6.5.4 Reinstall elevator to machine<br>6.5.5 Connect external attachment<br>6.5.6 Apply installing elevator procedure<br>6.5.7 Meticulous when installing elevator components   |
|  |  | 6.6 Test elevator operation         | 6.6.1 Apply Operation of elevator system<br>6.6.2 Testing elevator operations method<br>6.6.3 Determine operation of elevator system<br>6.6.4 Apply testing elevator operations method<br>6.6.5 Inspect elevator unit in function ability<br>6.6.6 Tidy up working area<br>6.6.7 Update log book<br>6.6.8 Meticulous when recording maintenance check sheet<br>6.6.9 Keep work areas clean, uncluttered and free of spills |



**COMPETENCY 7: Troubleshoot faulty transporting devices**

| CONTENT<br>STANDARD<br>performance               | Hrs | LEARNING STANDARD<br>performance , condition      | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--|-----|---|---|
| 7 Troubleshoot<br>faulty transporting<br>devices |     | 7.1 Obtain customer complaint form                | 7.1.1 Use Source of customer complaint form<br>7.1.2 Demonstrate Procedure to acquire customer complaint form<br>7.1.3 Utilize Customer complaint form<br>7.1.4 Determine source of customer complaint form<br>7.1.5 Acquire customer complaint form<br>7.1.6 Interpret customer complaint form   |
|  |     | 7.2 Obtain transporting devices<br>service manual | 7.2.1 Use Source of transporting devices service manual<br>7.2.2 Demonstrate Procedure to acquire transporting devices<br>service manual<br>7.2.3 Utilize Transporting devices service manual<br>7.2.4 Determine source of transporting devices service manual<br>7.2.5 Acquire transporting devices service manual<br>7.2.6 Interpret transporting devices service manual<br>7.2.7 Carefully read and observe precaution warnings given by<br>manual |
|  |     | 7.3 Execute troubleshooting works                 | 7.3.1 Distinguish Guessing possible root cause procedure<br>7.3.2 Predict Root cause of transporting devices fault<br>7.3.3 Utilize Diagnose tools and equipment<br>7.3.4 Guess possible root cause<br>7.3.5 Determine transporting devices fault<br>7.3.6 Use diagnose tools and equipment<br>7.3.7 Change transporting devices defect parts<br>7.3.8 Try transporting devices performance<br>7.3.9 Adhere to safety and health procedure            |

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|  |  | <p>7.4 Record service checklist</p> | <p>7.4.1 Apply Service checklist format</p> <p>7.4.2 Practice Technique to fill in service checklist</p> <p>7.4.3 Determine service checklist format</p> <p>7.4.4 Fill in service checklist</p> <p>7.4.5 Apply technique to fill in service checklist</p> <p>7.4.6 Meticulous when recording maintenance check sheet</p> <p>7.4.7 Keep work areas clean, uncluttered and free of spills</p> |
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**COMPETENCY 8: Troubleshoot faulty transporting devices**

| CONTENT<br>STANDARD<br>performance               | Hrs | LEARNING STANDARD<br>performance , condition      | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|--|-----|---|--|
| 8 Troubleshoot<br>faulty transporting<br>devices |     | 7.5 Obtain customer complaint form                | 7.1.7 Use Source of customer complaint form<br>7.1.8 Demonstrate Procedure to acquire customer complaint form<br>7.1.9 Utilize Customer complaint form<br>7.1.10 Determine source of customer complaint form<br>7.1.11 Acquire customer complaint form<br>7.1.12 Interpret customer complaint form   |
|  |     | 7.6 Obtain transporting devices<br>service manual | 7.2.8 Use Source of transporting devices service manual<br>7.2.9 Demonstrate Procedure to acquire transporting devices<br>service manual<br>7.2.10 Utilize Transporting devices service manual<br>7.2.11 Determine source of transporting devices service manual<br>7.2.12 Acquire transporting devices service manual<br>7.2.13 Interpret transporting devices service manual<br>7.2.14 Carefully read and observe precaution warnings given by<br>manual |
|  |     | 7.7 Execute troubleshooting works                 | 7.3.10 Distinguish Guessing possible root cause procedure<br>7.3.11 Predict Root cause of transporting devices fault<br>7.3.12 Utilize Diagnose tools and equipment<br>7.3.13 Guess possible root cause<br>7.3.14 Determine transporting devices fault<br>7.3.15 Use diagnose tools and equipment<br>7.3.16 Change transporting devices defect parts<br>7.3.17 Try transporting devices performance<br>7.3.18 Adhere to safety and health procedure        |

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|  |  | <p>7.8 Record service checklist</p> | <p>7.4.8 Apply Service checklist format</p> <p>7.4.9 Practice Technique to fill in service checklist</p> <p>7.4.10 Determine service checklist format</p> <p>7.4.11 Fill in service checklist</p> <p>7.4.12 Apply technique to fill in service checklist</p> <p>7.4.13 Meticulous when recording maintenance check sheet</p> <p>7.4.14 Keep work areas clean, uncluttered and free of spills</p> |
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**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**MODULE INFORMATION**

**Confidential**

**MODULE** : **FARMING EQUIPMENT REPAIR**  
**MODULE CODE** : **CAAM 412**  
**LEVEL** : **2**  
**SEMESTER** : **4**  
**CREDIT UNIT** : 2.0  
**CONTACT HOUR** : 1 hr/week (T) 2 hr/week (P)  
3 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

## MODULE OUTCOMES:

At the end of the course, the students should be able to:-

- Repair agricultural sprayer
- Repair power take-off drive shaft
- Replace rotor drive shaft assembly
- Repair turfing rotor slashes
- Repair fertilizer broadcaster

## MODULE DESCRIPTION

This unit identifies the competence required to repair agricultural sprayer using hand tools set, agricultural chemical pumps service manual, pump new spare parts and log books so that agricultural chemical pumps service manual obtained, chemical pumps components dismantled, chemical pumps components replacement works executed, chemical pumps components assembled, chemical pump operation tested in accordance with manufacturer's specification.

This unit identifies the competence required to repair power take –off using hand tools set, power take-off drive shaft service manual, grease, spare parts and log book so that power take-off drive shaft service manual identified, power take-off drive shaft assembly removed, power take-off drive shaft components dismantled, repairing work executed, power take-off drive shaft components assembled, power take-off drive shaft assembly installed and power take-off drive shaft operations tested in accordance with manufacturer's specification

This unit identifies the competence required to replace rotor drive shaft assembly unit using hand tools set, rotor drive shaft service manual, new rotor drive shaft, chain, sprocket, tensioner, straight edge, measuring tape and log book so that rotor drive shaft service manual obtained, rotor drive shaft assembly removed, rotor drive shaft components replacement works executed, rotor drive shaft sprocket & chain installed and rotor drive shaft operations tested in accordance with manufacturer's specification

This unit identifies the competence required to repair turfing rotor slasher using hand tools set, hydraulic oil, hydraulic pump service manual, bearing extractor, measuring equipment, new parts and log book so that hydraulic pump service manual obtained, hydraulic pump removed, pump components dismantled, pump components checked, pump components assembled, hydraulic pump installed and turfing rotor slasher performance tested in accordance with manufacturer's specification

This unit identifies the competence required to repair fertilizer broad caster using hand tools set, agricultural chemicals pumps service manual, pump new spare parts and log book so that fertilizer broad caster service manual obtained, fertilizer broad caster assembly removed, fertilizer broad caster components dismantled, fertilizer broad caster components checked, fertilizer broad caster components assembled, fertilizer broad

caster assembly installed and fertilizer broad casters performance tested in accordance with manufacturer's specification

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## CONTENT AND LEARNING STANDARD

### Programme : AGRICULTURAL MECHANIZATION

#### Module 10: FARMING EQUIPMENT REPAIR

#### COMPETENCY 1: Repair agricultural sprayer

| CONTENT STANDARD performance  | Hrs | LEARNING STANDARD performance , condition             | PERFORMANCE CRITERIA performance,condition, standard  |
|-------------------------------|-----|---|---|
| 1 Repair agricultural sprayer |     | 1.1 Obtain agricultural chemical pumps service manual | 1.1.1 Apply Source of agricultural chemical pumps service manual<br>1.1.2 Discuss Procedure of acquiring agricultural chemical pumps service manual<br>1.1.3 Adjusting reel and pick-up service manual<br>1.1.4 Determine source of reel and pick-up service manual<br>1.1.5 Acquire reel and pick-up service manual<br>1.1.6 Interpret adjusting cutting blade service manual<br>1.1.7 Carefully read and observe precaution warnings given by manual<br>1.1.8 |



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|  |  | 1.2 Dismantle chemical pumps components                 | 1.2.1 Classify Types of chemical pump<br>1.2.2 Demonstrate Operation of chemical pump<br>1.2.3 Discuss Procedure of dismantling chemical pump<br>1.2.4 Determine types of chemical pump<br>1.2.5 Determine operation of chemical pump<br>1.2.6 Determine types of pump connection<br>1.2.7 Disassemble pump cover<br>1.2.8 Disassemble pump parts and components<br>1.2.9 Soak component with detergent<br>1.2.10 Careful when handling chemical container and parts, it's may be toxic and harmful |
|  |  | 1.3 Execute chemical pumps components replacement works | 1.3.1 Distinguish Types of pump component defects<br>1.3.2 Replacing defective chemical pump components procedure<br>1.3.3 Determine types of chemical pump component defects<br>1.3.4 Inspect chemical pump component from defect<br>1.3.5 Measure parts from wear and teat<br>1.3.6 Change defective components<br>1.3.7 Apply replacing defective chemical pump components procedure<br>1.3.8 Conscientious when measure wear parts  |
|  |  | 1.4 Assemble chemical pumps components                  | 1.4.1 Describe Function of chemical pump<br>1.4.2 Demonstrate Procedure of assembling chemical pump<br>1.4.3 Determine function of chemical pump<br>1.4.4 Reassemble pump parts and components<br>1.4.5 Reinstall pump cover<br>1.4.6 Careful when handling poison chemical container   |

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|  |  | <p><b>1.5 Test chemical pump operations</b></p> <p>1.5.1 Demonstrate Pumping procedure</p> <p>1.5.2 Describe Method of testing chemical pump operation</p> <p>1.5.3 Updating log book</p> <p>1.5.4 Apply pumping procedure</p> <p>1.5.5 Apply testing chemical pump operation method</p> <p>1.5.6 Try chemical pump function ability</p> <p>1.5.7 Update log book</p> <p>1.5.8 Meticulous when recording maintenance check sheet</p> <p>1.5.9 Keep work areas clean, uncluttered and free of spills</p> <p>1.5.10 Tidy up working area</p> |
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**COMPETENCY 2: Repair power take-off drive shaft**

| CONTENT<br>STANDARD<br>performance  | Hrs | LEARNING STANDARD<br>performance , condition         | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|-------------------------------------|-----|--|--|
| 2 Repair power take-off drive shaft |     | 2.1 Obtain power take-off drive shaft service manual | 2.1.1 Use Source of power take-off drive shaft service manual<br>2.1.2 Apply Procedure to acquire power take-off drive s service manual<br>2.1.3 Practice Power take-off drive shaft service manual<br>2.1.4 Determine source of conveyor service manual<br>2.1.5 Acquire conveyor service manual<br>2.1.6 Interpret conveyor service manual<br>2.1.7 Carefully read and observe precaution warnings given by manual   |
|                                     |     | 2.2 Remove power take-off drive shaft assembly       | 2.2.1 Classify Types of power take-off drive(cardon) shaft and universal joint<br>2.2.2 Demonstrate Removing power take-off drive(cardon) shaft and universal joint procedure<br>2.2.3 Determine types of power take-off drive(cardon) shaft and universal joint<br>2.2.4 Uninstall universal joint<br>2.2.5 Uninstall cardoon shaft<br>2.2.6 Apply removing power take-off drive(cardon) shaft and universal joint procedure<br>2.2.7 Lift and handle all heavy components using lifting equipment of adequate capacity |

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|  |  | 2.3 Dismantle power take-off drive shaft components | 2.3.1 Classify Types of power take-off drive shaft components<br>2.3.2 Demonstrate Dismantling power take-off drive shaft components<br>2.3.3 Distinguish Types of detergent<br>2.3.4 Determine type of power take-off drive shaft components<br>2.3.5 Disassemble universal joint components<br>2.3.6 Disassemble cardon shaft parts<br>2.3.7 Soak parts with detergent<br>2.3.8 Do not wear rings, wristwatches, jewels and unbuttoned clothing   |
|  |  | 2.4 Execute repairing work                          | 2.4.1 Distinguish Types of power take-off drive shaft components defect<br>2.4.2 Demonstrate Replacing power take-off drive shaft component procedure<br>2.4.3 Demonstrate Repairing power take-off drive shaft component method<br>2.4.4 Determine types of power take-off drive shaft components defect<br>2.4.5 Apply replacing power take-off drive shaft component procedure<br>2.4.6 Apply repairing power take-off drive shaft component method<br>2.4.7 Adhere to safety and health procedure |
|  |  | 2.5 Assemble power take-off drive shaft components  | 2.5.1 Distinguish Types of power take-off drive shaft components<br>2.5.2 Demonstrate Assembling power take-off drive shaft components<br>2.5.3 Determine types of power take-off drive shaft components<br>2.5.4 Reassemble universal joint components<br>2.5.5 Reassemble cardon shaft parts<br>2.5.6 Meticulous when assembling universal joint components   |

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|  |  | 2.6 Install power take-off drive shaft assembly | 2.6.1 Compare Types of power take-off drive(cardon) shaft and universal joint<br>2.6.2 Demonstrate Assembling power take-off drive(cardon) shaft and universal joint procedure<br>2.6.3 Determine types of power take-off drive(cardon) shaft and universal joint<br>2.6.4 Uninstall cardon shaft assembly<br>2.6.5 Uninstall universal joint assembly<br>2.6.6 Apply assembling power take-off drive(cardon) shaft and universal joint procedure<br>2.6.7 Patient when working at tight area  |
|  |  | 2.7 Test power take-off drive shaft operations  | 2.7.1 Demonstrate Starting engine procedure<br>2.7.2 Classify Testing power take-off drive shaft operation method<br>2.7.3 Apply starting engine procedure<br>2.7.4 Apply testing power take-off drive shaft operation method<br>2.7.5 Inspect power take-off drive shaft function ability<br>2.7.6 Tidy up working area<br>2.7.7 Update log book<br>2.7.8 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction<br>2.7.9 Meticulous when filling service checklist form |

**COMPETENCY 3: Replace rotor drive shaft assembly**

| CONTENT<br>STANDARD<br>performance   | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|--------------------------------------|-----|--|---|
| 3 Replace rotor drive shaft assembly |     | 3.1 Obtain rotor drive shaft service manual  | 3.1.1 Use Source of rotor drive shaft service manual<br>3.1.2 Apply Procedure to acquire rotor drive shaft service manual<br>3.1.3 Utilize Rotor drive shaft service manual<br>3.1.4 Determine source of rotor drive shaft service manual<br>3.1.5 Acquire rotor drive shaft service manual<br>3.1.6 Interpret rotor drive shaft service manual<br>3.1.7 Carefully read and observe precaution warnings given by manual   |
|                                      |     | 3.2 Remove rotor drive shaft assembly        | 3.2.1 Classify Types of rotor drive shaft<br>3.2.2 Distinguish Function of rotor drive shaft<br>3.2.3 Demonstrate Removing rotor drive shaft assembly procedure<br>3.2.4 Determine types of rotor drive shaft sprocket & chain<br>3.2.5 Determine function of rotor drive shaft sprocket & chain<br>3.2.6 Uninstall chain case cover<br>3.2.7 Dismantle chain, sprocket and tensioner<br>3.2.8 Uninstall rotor drive shaft<br>3.2.9 Apply removing rotor drive shaft sprocket & chain procedure |

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|  |  | <p>3.3 Execute components replacements works</p>          | <p>3.3.1 Distinguish Types of rotor drive shaft components defects</p> <p>3.3.2 Apply Checking rotor drive shaft components procedure</p> <p>3.3.3 Determine types of rotor drive shaft components defects</p> <p>3.3.4 Inspect rotor drive shaft components from defects such as</p> <ul style="list-style-type: none"> <li>• Chain</li> <li>• Sprocket</li> <li>• Tensioner</li> <li>• Rotor drive shaft</li> </ul> <p>3.3.5 Change defective rotor drive shaft components</p> <p>3.3.6 Conscientious when measure wear parts</p>   |
|  |  | <p>3.4 Install rotor drive shaft sprocket &amp; chain</p> | <p>3.4.1 Distinguish Function ability of rotor drive shaft sprocket &amp; chain</p> <p>3.4.2 Demonstrate Installing rotor drive shaft components procedure</p> <p>3.4.3 Assemble new rotor drive shaft components such as</p> <ul style="list-style-type: none"> <li>• Rotor drive shaft</li> <li>• Tensional</li> <li>• Sprocket</li> <li>• Chain</li> </ul> <p>3.4.4 Adjust chain tension</p> <p>3.4.5 Reinstall chain case cover</p> <p>3.4.6 Apply installing rotor drive shaft components procedure</p> <p>3.4.7 Meticulous when installing rotor drive shaft components</p> |

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|  |  | <p>3.5 Test rotor drive shaft operations</p> | <p>3.5.1 Demonstrate Starting engine procedure</p> <p>3.5.2 Apply Testing rotor drive shaft operations method</p> <p>3.5.3 Apply engine starting procedure</p> <p>3.5.4 Apply testing rotor drive shaft operations method</p> <p>3.5.5 Inspect rotor drive shaft in function ability</p> <p>3.5.6 Tidy up working area</p> <p>3.5.7 Update log book</p> <p>3.5.8 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>3.5.9 Meticulous when filling service checklist form</p> |
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**COMPETENCY 4: Repair turfing rotor slasher**

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition    | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|------------------------------------|-----|---|--|
| 4 Repair turfing rotor slasher     |     | 4.1 Obtain turfing rotor slasher service manual | 4.1.1 Use Sources of turfing rotor slasher service manual<br>4.1.2 Apply Procedures of acquiring turfing rotor slasher service manual<br>4.1.3 Utilize turfing rotor slasher service manual<br>4.1.4 Determine source of turfing rotor slasher service manual<br>4.1.5 Acquire turfing rotor slasher service manual<br>4.1.6 Interpret turfing rotor slasher service manual<br>4.1.7 Interpret turfing rotor slasher circuit<br>4.1.8 Carefully read and observe precaution warnings given by manual |
|                                    |     | 4.2 Remove hydraulic pump                       | 3.2.1 Distinguish Types of hydraulic pump<br>3.2.2 Classify Hydraulic system<br>3.2.3 Distinguish Types of hydraulic oil<br>3.2.4 Demonstrate Procedure of removing turfing rotor slasher<br>3.2.5 Determine types of hydraulic pump<br>3.2.6 Depressurize hydraulic system<br>3.2.7 Disconnect hydraulic linkages<br>3.2.8 Uninstall turfing rotor slasher assembly<br>3.2.9 Plug hoses and piping end for safety   |

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|  |  | 4.3 Dismantle pump component     | <p>3.3.1 Distinguish Procedure of dismantling turving rotor slasher parts and components</p> <p>3.3.2 Distinguish Types of solvent</p> <p>3.3.3 Demonstrate Disassemble pump parts and components</p> <p>3.3.4 Demonstrate Washing pump parts and component with solvent</p> <p>3.3.5 Demonstrate Uninstalling cap screws and washers</p> <p>3.3.6 Mark pump end cover</p> <p>3.3.7 Uninstall cap screws and washers</p> <p>3.3.8 Lift off pump port and cover</p> <p>3.3.9 Determine disassemble pump parts and components</p> <p>3.3.10 Wash pump parts and component with solvent</p> <p>3.3.11 Meticulous when removing internal parts of pump</p>      |
|  |  | 4.4 Check pump components defect | <p>3.4.1 Distinguish Types of turving rotor slasher components defect</p> <p>3.4.2 Demonstrate Procedure of inspection of pumping element from defect</p> <p>3.4.3 Apply Measuring bearing from roughness, excessive wear and damage races technique</p> <p>3.4.4 Demonstrate Changing oil seals, "O" rings and bearing</p> <p>3.4.5 Types of turving rotor slasher components defect</p> <p>3.4.6 Procedure of inspection of pumping element from defect</p> <p>3.4.7 Measuring bearing from roughness, excessive wear and damage races technique</p> <p>3.4.8 Changing oil seals, "O" rings and bearing</p> <p>3.4.9 Meticulous when placing "O" ring</p> |

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|  |  | 4.5 Assemble pump components | <p>3.5.1 Demonstrate Procedure of assembling pump parts and components</p> <p>3.5.2 Apply Inserting pump port and cover technique</p> <p>3.5.3 Apply Confirming pump end cover marking</p> <p>3.5.4 Demonstrate Tightening cap screws and washers</p> <p>3.5.5 Reassemble pump parts and components</p> <p>3.5.6 Insert pump port and cover</p> <p>3.5.7 Confirm pump end cover marking</p> <p>3.5.8 Tighten cap screws and washers</p>     |
|  |  | 4.6 Install hydraulic pump   | <p>3.6.1 Distinguish Types of hydraulic pump</p> <p>3.6.2 Demonstrate Installing turfing rotor slasher procedure</p> <p>3.6.3 Apply Fixing hydraulic linkages</p> <p>3.6.4 Determine types of hydraulic pump</p> <p>3.6.5 Reinstall turfing rotor slasher assembly</p> <p>3.6.6 Fix hydraulic linkages</p> <p>3.6.7 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> |

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|  |  | <p>4.7 Test turfing rotor slasher performance</p> | <p>3.7.1 Demonstrate Engine starting procedure</p> <p>3.7.2 Demonstrate Operating hydraulic system</p> <p>3.7.3 Apply Testing turfing rotor slasher performance</p> <p>3.7.4 Apply Inspecting system from leakage</p> <p>3.7.5 Demonstrate Switching off engine</p> <p>3.7.6 Updating log book</p> <p>3.7.7 Apply engine starting procedure</p> <p>3.7.8 Operate turfing rotor slasher system</p> <p>3.7.9 Apply testing turfing rotor slasher performance</p> <p>3.7.10 Inspect system from leakage</p> <p>3.7.11 Switch off engine</p> <p>3.7.12 Update log book</p> <p>3.7.13 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>3.7.14 Meticulous when filling service checklist form</p> <p>3.7.15 Keep work areas clean, uncluttered and free of spills</p> <p>3.7.16 Tidy up working area</p> |
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**COMPETENCY 5:** Repair fertilizer broadcaster

| CONTENT<br>STANDARD<br>performance | Hrs | LEARNING STANDARD<br>performance , condition      | PERFORMANCE CRITERIA<br>performance,condition, standard   |
|------------------------------------|-----|---|---|
| 5 Repair fertilizer broadcaster    |     | 5.1 Obtain fertilizer broad caster service manual | 5.1.1 Use Source of fertilizer broad caster service manual<br>5.1.2 Apply Procedures of acquiring fertilizer broad caster service manual<br>5.1.3 Utilize Fertilizer broad caster service manual<br>5.1.4 Determine source of fertilizer broad caster service manual<br>5.1.5 Acquire fertilizer broad caster service manual<br>5.1.6 Interpret fertilizer broad caster service manual<br>5.1.7 Interpret fertilizer broad caster circuit<br>5.1.8 Carefully read and observe precaution warnings given by manual |
|                                    |     | 5.2 Remove fertilizer broad caster assembly       | 5.2.1 Distinguish Hydraulic system<br>5.2.2 Distinguish Types of hydraulic oil<br>5.2.3 Demonstrate Procedure of removing fertilizer broad caster assembly procedure<br>5.2.4 Connect Draining hydraulic oil from the ram<br>5.2.5 Depressurize hydraulic system<br>5.2.6 Disconnect hydraulic linkages<br>5.2.7 Uninstall fertilizer broad caster assembly<br>5.2.8 Drain hydraulic oil from the ram<br>5.2.9 Plug hoses and piping end for safety   |

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|  |  | 5.3 Dismantle fertilizer broad caster components | 5.3.1 Use Fertilizer broad caster components<br>5.3.2 Distinguish Procedure of dismantling fertilizer broad caster components<br>5.3.3 Demonstrate Disassemble piston seals, rod seal and rod wiper<br>5.3.4 Apply Soaking components with detergent<br>5.3.5 Uninstall front cap<br>5.3.6 Uninstall piston rod from cylinder housing<br>5.3.7 Disassemble piston seals, rod seal and rod wiper<br>5.3.8 Soak components with detergent<br>5.3.9 Meticulous when removing piston rod.   |
|  |  | 5.4 Check fertilizer broad caster components     | 5.4.1 Distinguish Types of fertilizer broad caster components defect<br>5.4.2 Apply Inspecting rod alignment method<br>5.4.3 Use Inspection of fertilizer broad caster parts and components defect procedure<br>5.4.4 Demonstrate Checking fertilizer broad caster components procedure<br>5.4.5 Demonstrate Changing defect parts and components<br>5.4.6 Determine types of fertilizer broad caster components defect<br>5.4.7 Inspect rod alignment<br>5.4.8 Inspect fertilizer broad caster parts and components from defect<br>5.4.9 Apply procedure of checking fertilizer broad caster components<br>5.4.10 Change defect parts and components<br>5.4.11 Meticulous when removing piston rod |

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|  |  | <p>5.5 Assemble fertilizer broad caster components</p> | <p>5.5.1 Utilize Fertilizer broad caster components</p> <p>5.5.2 Demonstrate Assembling fertilizer broad caster components procedure</p> <p>5.5.3 Demonstrate Reinstalling front cap</p> <p>5.5.4 Demonstrate Procedure of assembling fertilizer broad caster components</p> <p>5.5.5 Reassemble piston seals, rod seal and rod wiper</p> <p>5.5.6 Reinstall piston rod from cylinder housing</p> <p>5.5.7 Reinstall front cap</p> <p>5.5.8 Follow procedure of assembling fertilizer broad caster components</p> |
|  |  | <p>5.6 Install fertilizer broad caster assembly</p>    | <p>5.6.1 Distinguish Hydraulic system</p> <p>5.6.2 Distinguish Types of hydraulic oil</p> <p>5.6.3 Demonstrate Removing cylinder ram assembly procedure</p> <p>5.6.4 Reinstall cylinder ram assembly</p> <p>5.6.5 Connect hydraulic linkages</p> <p>5.6.6 Top up hydraulic oil</p> <p>5.6.7 Ensure unplug hoses and piping before installation works</p>  |

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|--|--|--|---|
|  |  | <p>5.7 Test fertilizer broad casters performance</p> | <p>5.7.1 Demonstrate Engine starting procedure</p> <p>5.7.2 Classify Operating hydraulic system</p> <p>5.7.3 Practice Testing hydraulic performance method</p> <p>5.7.4 Apply Inspecting system from leakage</p> <p>5.7.5 Demonstrate Switching of engine</p> <p>5.7.6 Updating log book</p> <p>5.7.7 Apply engine starting procedure</p> <p>5.7.8 Operate fertilizer broad caster system</p> <p>5.7.9 Apply testing hydraulic performance method</p> <p>5.7.10 Inspect system from leakage</p> <p>5.7.11 Switch of engine</p> <p>5.7.12 Update log book</p> <p>5.7.13 Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction</p> <p>5.7.14 Tidy up working area</p> |
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**MINISTRY OF EDUCATION, MALAYSIA**  
**CURRICULUM DEVELOPMENT DIVISION**  
**VOCATIONAL COLLEGE STANDARD CURRICULLUM**

**KETERANGAN MODUL**

**Confidential**

**MODULE** : **TRACTOR HANDLING**  
**MODULE CODE** : **CAAM 413**  
**LEVEL** : **2**  
**SEMESTER** : **4**  
**CREDIT UNIT** : 3.0  
**CONTACT HOUR** : 1 hr/week (T) 5 hr/week (P)  
6 hr/week (Total)  
**MODULE STATUS** : VOCATIONAL  
**PREREQUISITE** : -

### **OBJEKTIF MODUL:**

Through this module, students will be able to: -

- Operate four wheel tractors without trailers
- Operate four wheel tractors with trailers

### **KETERANGAN MODUL**

This module explains the use of agricultural machinery. The use of agricultural machinery and equipment is intended to expose the students to the field of agricultural mechanization. This module provides an opportunity for students to use and operate four wheel tractor with and without the trailer. Among aspects to be studied by students in this module include four-wheel tractor operation with the trailer and without the trailer. Knowledge about the use of hand tools were used in this module. For example the use of power tools and other hand tools while maintaining the equipment used. Therefore the students will acquire skills in using the equipment.

## KANDUNGAN DAN STANDARD PEMBELAJARAN

### Program : AGRICULTURAL MECHANIZATION

#### Module 13 : TRACTOR HANDLING

#### KOMPETENSI 1: Operate four wheel tractors without trailers

| CONTENT<br>STANDARD<br>performance              | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|---|-----|--|--|
| 1. Operate four wheel tractors without trailers |     | 1.1 Perform daily inspection                 | 1.1.1 Describe daily inspection procedures before, during and after handling tractor<br>1.1.2 Conduct daily inspections before, during and after handling tractor<br>1.1.3 Using the right tools<br>1.1.4 Wear appropriate clothing<br>1.1.5 Compliance and read carefully the instruction of user manual  |
|   |     | 1.2 Driving a tractor without the trailer    | 1.2.1 Describe daily inspection procedures before driving tractor<br>1.2.2 Describe method of tractor operation<br>1.2.3 Describe method to stop the tractor<br>1.2.4 Starting and operating tractor<br>1.2.5 Stop the tractor according to the procedure<br>1.2.6 Follow safety precaution procedure<br>1.2.7 Follow the instructions given by teachers |

**KOMPETENSI 2:** Mengendali traktor 4 roda dengan treler

| CONTENT<br>STANDARD<br>performance           | Hrs | LEARNING STANDARD<br>performance , condition | PERFORMANCE CRITERIA<br>performance,condition, standard  |
|--|-----|--|--|
| 2. Operate four wheel tractors with trailers |     | 2.1 Perform daily inspection                 | 2.1.1 Describe daily inspection procedures before, during and after handling tractor<br>2.1.2 Conduct daily inspections before, during and after handling tractor<br>2.1.3 Using the right tools<br>2.1.4 Wear appropriate clothing<br>2.1.5 Compliance and read carefully the instruction of user manual  |
|  |     | 2.2 Attaching of implement (trailer)         | 2.2.1 Explain procedure attach and remove the trailer from four wheel tractor pull bar<br>2.2.2 Attach and remove trailer from four wheel tractor pull bar properly<br>2.2.3 Wear appropriate clothing<br>2.2.4 Follow teacher instructions<br>2.2.5 Ensure the tractor is in good condition before use  |
|  |     | 2.3 Driving a tractor with the trailer       | 2.3.1 Describe method of operation tractors with trailer<br>2.3.2 Explaining the four wheel tractor with trailer reverse methods<br>2.3.3 Explain the procedure to do L parking and side parking properly<br>2.3.4 Operating the four-wheel tractors with trailers<br>2.3.5 Perform L parking and side parking in the parking space provided<br>2.3.6 Perform four wheel tractors with trailers reverse<br>2.3.7 Wear appropriate clothing<br>2.3.8 Follow safety precaution procedure |